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EMERGENCY BLOOD MATCHING, TYPING & TRANSFUSION*

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NEW ORLEANS

IT almost goes without saying that under ordinary circumstances one who proposes to perform blood transfusion should either himself be a competent laboratory man or avail himself of the services of a well-trained and reliable laboratory consultant with respect to preliminary testing of the bloods which he proposes to mix, in order to make sure that they are compatible. Occasionally, however, it is highly desirable that the transfusionist, although not a general laboratorian, should himself be able to perform the necessary preliminary tests, especially in an emergency. Furthermore, blood transfusion being in many cases an emergency procedure and one which may become a great desideratum in places far removed from elaborate laboratory facilities, a simple technique, provided it be reliable, would seem to have value.

The process of determining compatibility is not really a difficult one and can be mastered with very little effort and the expenditure of a moderate amount of time. It does not, of course, necessarily involve the determination of the blood group of either donor or recipient, but consists in its simplest form merely of testing the agglutinating power of the recipient's serum upon the donor's red blood cells. About one-third of random transfusions give severe reactions because of incompatibility, and about 5 per cent are of such severity as to prove fatal or at least seriously to jeopardize the life of the recipient. The simple procedure of determining that the cells of the donor will not be agglutinated by the recipient's serum makes transfusion virtually 100 per cent safe, since the dilution of the donor's serum in the total blood volume of the recipient seems practically to negate the possible ill effects of the converse effect, viz., the agglutination of the recipient's cells by the donor's serum. To test the agglutinating power of the donor's serum for the cells of the recipient is, however, as simple as the reverse, and accordingly, in case there is a choice of donors and it is desired to make use of the most suitable one, both processes may and should be performed.

The process of "direct matching" is satisfactorily performed by the following simple method, which requires only normal saline solution, glass slides and coverslips, small test-tubes and capillary pipettes, which latter may be readily fashioned from glass tubing by "drawing out" the latter in the flame of a Bunsen burner. These pieces of paraphernalia are available to almost any practitioner, however far removed he be from a laboratory center.

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Sufficient blood for both tests may usually be obtained from both donor and recipient by puncturing the lobe of the

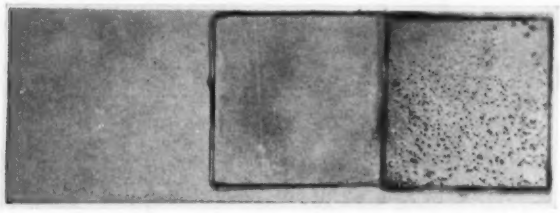

Fig. 1. Positive agglutination (brick-dust appearance) on right and negative agglutination (homogeneity) on left. (Note that due to spreading of one preparation into other at margin between two coverslips a very slight amount of agglutination is seen in left-hand preparation.)

ear or the finger but occasionally venipuncture may be required. A large drop or two of blood is allowed to fall directly into about 5 c.c. (the exact amount is of no moment) of normal saline solution in a test-tube, and as much more as can be conveniently obtained is allowed to fall into the bottom of a second dry test-tube. The tube of blood in saline is either simply placed aside to settle or is centrifuged (providing facilities for the latter purpose be at hand); the tube containing blood alone is set aside to coagulate.

If "cross matching" is to be performed, i.e., both the testing of donor's cells against recipient's serum and recipient's cells against donor's serum, a pair of such tubes is prepared from both donor and recipient. If "simple matching" only is desired, i.e., the testing of the donor's cells against the recipient's serum, blood in saline is taken from the donor and unmodified blood from the recipient.

After centrifrugalization of the blood in saline or after the cells have completely settled to the bottom of the tube the supernatant saline is withdrawn with a pipette and discarded. This process removes the donor's native serum and provides washed red cells. About 10 volumes of fresh saline solution are now added to make a 10 per cent suspension of red cells; this percentage does not need to be exact, but it is fairly easy to estimate with accuracy, since if one drop of blood was used originally and not too much of it was lost in the process of washing, about 9 drops of saline would of course be required.

The clot having retracted in the tube of whole blood set away to coagulate, a drop of clear serum is now sucked up into a clean capillary pipette and delivered to the surface of a clean glass slide. If the recipient's serum has been taken, a drop of the donor's cell suspension is now similarly sucked up in a clean pipette and is added to the drop of serum, both being mixed together. The slide is kept in a warm place for at least a minute (it is not safe to read a negative reaction in less than three minutes), and is then observed against a white background; one of the best ways to do this is to place a clean white sheet of paper upon the table upon which one is working and make the observation against this by holding the slide between the fingers and about 2 in. above the surface of the paper.

Lack of agglutination is manifested by the maintenance of homogeneity in the smear, agglutination by the assumption of an appearance which has been likened to "brick dust;" i.e., the red cells become grouped together in small red clumps. Usually there is no doubt as to whether the reaction is positive or negative. At this stage however, in case of doubt, the simple expedient of gently covering the preparation with a coverslip will settle the matter definitely, since the latter procedure emphasizes the size of the conglomerated particles which occasionally, as a result of this manipulation, approach the size of the head of a pin. This magnifying effect does not occur in case inversion of the coverslip is made immediately after the preparation is placed on the slide, so that the directions should be followed precisely as outlined. Figure 1 represents the appearance of both negative and positive agglutination reactions when brought side by side on a single glass slide.

In the event that any shadow of doubt remains as to the reading of a given

suspected positive, a definite negative reaction may, of course, be prepared for comparison by mixing cells and serum both from the same specimen.

The process of matching recipient's cells against donor's serum proceeds in exactly the same manner. Completely compatible bloods show both reactions negative, but in case the recipient's serum does not agglutinate the donor's cells the transfusion may proceed without much risk. If the recipient's serum does agglutinate the donor's cells, the only circumstance that would prevent a serious or even fatal reaction would be failure of hemolysis to ensue upon agglutination.

Blood grouping, though not a more formidable undertaking, is of less value than direct matching in any actual transfusion, since untoward reactions are possible, even though grouping is accurately determined, incompatibilities having been demonstrated within groups. However, in case grouping becomes desirable, as in cases in which it is desired to classify donors for future emergencies or to determine the likelihood of compatibility of persons at a distance, the grouping of which is already known, such a procedure is entirely feasible with no other equipment than has already been described, providing only the blood group of the operator himself or of some other available person be accurately known to be of either Group II or Group III.

The technique proceeds precisely as in "cross-matching," i.e., the serum of the person of the known blood group is mixed with the red-cell suspension of the unknown and vice versa, and the reactions are read. The blood group of the unknown appears as the result of a process of logical deduction, e.g.:

Example 1. The known blood belongs to Group III. By cross-matching it is found (1) that the serum of the known specimen agglutinates the cells of the unknown specimen; (2) but that the cells of the known specimen are not agglutinated by the serum of the unknown specimen.

Process of deduction (using Jansky's classification):

A. The serum of Group III is known to agglutinate the cells of Groups II and IV only, so that the unknown blood must belong to one of these.
B. The cells of group III are known to be agglutinated only by groups I and II.
C. The only group which is common to both A and B, i.e., that fulfills the conditions actually found, is Group II; consequently the unknown must belong to Group II.

Example 2. The known blood belongs to Group II. By cross-matching it is found (1) that the serum of known specimen does not agglutinate the cells of the unknown; (2) neither are the cells of the known specimen agglutinated by the serum of the unknown.

Process of deduction (using Jansky's classification):

A. The serum of Group II is known to agglutinate the cells of groups III and IV only, so that the unknown must belong to either Group I or II.
B. The cells of group II are agglutinated only by Group I and Group III.
C. The only group which is common to both A and B, i.e., that fulfills the condition actually found is Group I; consequently the unknown belongs to Group I.

Reasoning the various possible combinations through in this manner Table I can be constructed and will serve for rapid

TABLE I

	Serum of Known and Cells of Unknown	Cells of Known and Serum of Unknown	
GROUP I	− (I)	− (I, II, III, IV)	I
		Does not occur	
	+ (II, III, IV)	− (I, II, III, IV)	No conclusion
		Does not occur	(II, III, or IV)
GROUP II	− (I, II)	− (II, IV) + (I & III)	II I
	+ (III, IV)	− (II, III) + (I, III)	IV III
GROUP III	− (I & III)	− (III & IV) + (I & II)	III I
	+ (II & IV)	− (III & IV) + (I & II)	IV II
GROUP IV	− (I, II, III, IV) + Does not occur	− (IV) + (I, II, III)	IV

reference. In the interests of completeness the table is also worked out for Groups I and IV, in order to show why these two blood groups cannot be used for the purpose under discussion.

Many methods for the actual performance of blood transfusion have been devised, some of which are relatively simple, others fairly complicated. Many require specially prepared and fitted metal valves; others make use of special types of glassware. Most of the various specially prepared pieces of apparatus have points of advantage and accordingly have attracted to themselves advocates, in the hands of whom they give excellent results.

For the performance of emergency transfusion, however, a procedure which frequently must be undertaken under adverse circumstances and which, in any case, is likely to be required at the hands of one not especially skilled in any particular method, or in a place where special equipment is not to be had, a method which requires merely such apparatus as can usually be obtained wherever any laboratory apparatus at all is obtainable, and one which is quite simple, would seem to be of value. Such a method almost of necessity requires the use of an anti-

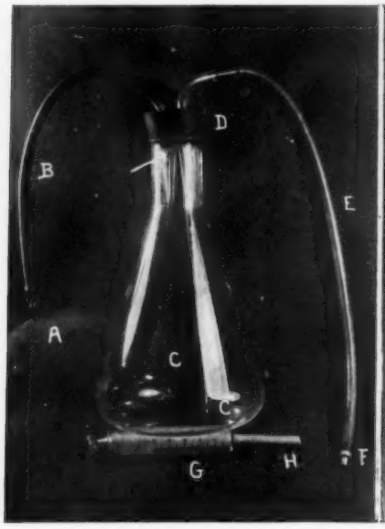

Fig. 2.

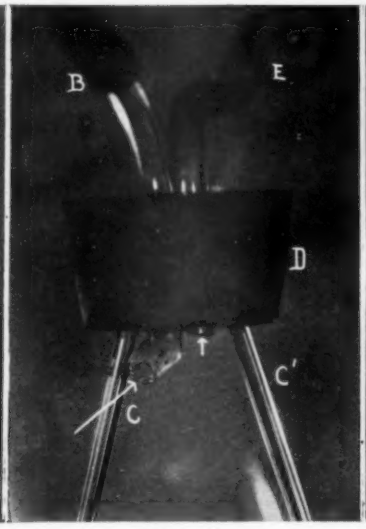

Fig. 3.

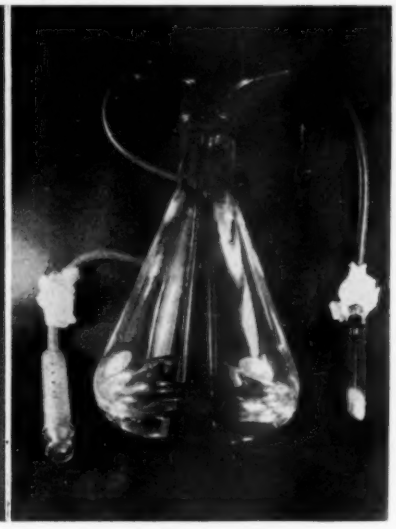

Fig. 4.

Fig. 2. Photograph of simple apparatus for blood transfusion partly assembled. A larger syringe (20 c.c.) may be used.

Fig. 3. Enlarged photograph of rubber stopper and glass tubes shown in Figure 2. Lettering corresponds with that of Figure 2.

Fig. 4. Photograph of same apparatus as Figure 2 and Figure 3 but assembled for sterilization. Note sodium citrate solution in bottom of flask and scratch mark on glass indicating volume of 500 c.c.

coagulant because the use of such a substance enables one man to perform virtually the entire technique, while at the same time doing away with the necessity for haste or at least the amount of expedition commonly required in methods using whole blood, which coagulates in a relatively short time.

Other things being equal, for the performance of any relatively unfamiliar technique the fewer pieces of apparatus required the better. An apparatus for transfusion of this type, using sodium citrate as an anticoagulant and meeting the requirements of simplicity and relative availability of material is illustrated herewith.

The reservoir into which the blood is withdrawn from the donor and which also serves to hold it until it is delivered to the veins of the recipient is an Erlemeyer flask of 1 liter capacity (Fig. 2). A two-holed rubber stopper, D, of such size as accurately to fit the neck of the flask is

prepared as shown in Figure 3; a short piece of glass tubing, E, is bent to a right angle and pushed through one hole of the stopper so that it just protrudes (see small arrow); another slightly longer piece of glass tubing (B in Fig. 3) is bent as shown at the long arrow, the tube then being pushed through the other hole of the stopper, this time from below upward, and is subsequently bent to a right angle to correspond, above the stopper, with the shape of the first right-angled piece. Holes are now bored into but not all the way through the stopper from below upward to receive and hold tightly the two pieces of solid glass rod, C and C^1. The glass rods are cut of sufficient length to reach almost to the bottom of the flask when the stopper has been fitted to it.

In order to insert the stopper thus prepared the free ends of the glass rods are gently brought toward each other, the elasticity of the rubber stopper facilitating this manipulation; as soon as the rods have been brought virtually into parallelism they can be inserted into the flask and as the stopper is pushed into the flask they flare again to the divergent position they formerly occupied.

Referring again to Figure 2, the remaining essential parts of the apparatus are two pieces of rubber tubing, B and E, the former about 9 in. in length and the latter somewhat longer; both pieces of rubber tubing carry on their free ends needle-adapters.

When using the apparatus sufficient sodium citrate solution is placed in the flask to prevent the coagulation of the amount of blood which it is proposed to withdraw and inject. The sodium citrate is prepared in 2 per cent solution in normal saline, and 10 c.c. of this solution is added for every 100 c.c. of blood to be transfused. This makes the resulting dilution of citrate 0.2 per cent, which is ample to prevent coagulation.

The apparatus and solution are rendered sterile, as will subsequently be described. When it is desired to perform transfusion the flask is momentarily inverted so as to fill tube B and its attached needle with citrate solution; the flask is then turned right side up and needle A (attached to tube B) is thrust into a vein of the donor, blood being allowed to flow into the flask. The apparatus is designed, as will be seen, to provide as short a piece of tubing as possible from donor to flask, so as to minimize the possibility of coagulation within the tube. The bend in the glass tubing at the arrow conducts the blood stream to the side of one of the solid glass rods down which it trickles, thus avoiding a considerable drop from the stopper to the bottom of the flask and the consequent danger of foaming of the blood as it accumulates. During the process of withdrawing blood the flask is twirled, the solid glass rods acting as stirring rods. If the blood trickling down the glass rod shows a tendency to flow slowly the precaution of tilting the flask so as to bathe the rod in the blood-citrate solution already present will prevent coagulation on the rod.

When sufficient blood has been obtained the needle is withdrawn from the vein of the donor, disconnected from the apparatus and discarded. The flask is gently rotated so as to keep mixing the contents until ready to inject the blood into the veins of the recipient. For the latter purpose a needle is attached to the needle adapter F and the flask is inverted, being careful to keep the end of the tube B up so as to prevent spillage of blood through it. As soon as air has been expelled from tube E and its attached needle and this part of the apparatus is full of blood, the needle may be inserted into the vein of the recipient, and injection proceeds by gravity.

The glass syringe G and the rubber tube connection H are sterilized attached to F. Suction may be exerted by means of the syringe during the withdrawing of blood if necessary, or be removed and laid aside, but in any case the piece of rubber tubing serves the purpose of maintaining the sterility of the needle adapter. Similarly, syringe and rubber tube may be

applied to B for the purpose of exerting pressure during subsequent injection of the blood.

The apparatus completely assembled and ready to be finally wrapped for sterilization is illustrated in Figure 4. The flask in the photograph is marked to indicate when 500 c.c. of blood have been withdrawn, this being the size of the ordinary blood transfusion, but other graduations may, of course, be added or substituted if desired. Sterilization is best effected by autoclaving. Some will possibly object to the addition of the total amount of citrate at first on the grounds that as little citrate as possible should be used and that accordingly it should be added a little at a time, as more and more blood is withdrawn, in order to obviate an excess amount of citrate in case not all of the blood originally expected is obtained; this would be a valid objection if there were any real evidence that sodium citrate is a harmful substance. If the objection be deemed valid, however, in spite of this, citrate solution may, of course, be added to a previously unprepared apparatus such as this by means of the syringe provided in amounts as large or as small as one wishes.

It is, of course, true that various attacks in the past have been launched against sodium citrate on the score of toxicity but none of them have been substantiated by more recent investigations. It seems well established that virtually all of the sodium citrate introduced into the blood stream in the course of a transfusion is eliminated in a very few minutes, that it has no demonstrable harmful effect on any of the blood elements, and that, far from increasing the coagulation time of the recipient's blood, it actually increases its coagulability.

Rubber tubing and rubber stoppers should be carefully scrubbed and boiled before being used as part of any transfusion apparatus for fear of reactions which might result from the use of new rubber. Although reactions are supposed to occur more frequently when using sodium citrate as an anticoagulant than when using unmodified blood, the performance of citrate transfusion in many thousands of cases during the past fifteen years has demonstrated that the method is safe, and it is probably true that most of the bad effects attributed to sodium citrate in the past have been actually due more to faulty technique than to drug action.

INGROWING TOE NAIL*

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BROOKLYN

THIS is a condition in which the lateral edge of a nail has become imbedded in the adjacent soft parts of the lateral nail groove, giving rise to an inflammation of the matrix and soft parts about the nail.[1]

A proper knowledge of this disease and its treatment must commence with a study of the anatomy of the region. A nail is a portion of the epidermis modified for special function. It has a root, which is implanted into a groove in the skin; a body, which is the exposed portion; and a free edge.

The portion of cutis beneath the root and body is called the matrix, because it is the part from which the nail is produced.[2] In reality the nail grows from a thick layer of epithelial cells above and below the nail, the former extending nearly to the reflection of the skin and the latter to the white semilunar line.[3] The distal half of the matrix is thinner, more fibrous and less vascular.

The cuticle is attached to the surface of the nail in advance of its root and to its under surface a little behind the free edge. The successive growth of new cells at the root and under surface of the body causes the nail to advance forward and maintain its shape. The great toe nail takes about six months to travel its entire distance.

An ingrowing nail is largely a disease of civilization caused by one of the following:

A. Bad shoes.
   1. Too short.
   2. Too pointed.
   3. Not a straight last.
   4. Too narrow at the toe.
   5. Low stiff cap.
   6. High heels.

B. Bad stockings.
   1. Too short.
   2. Too tight at the toe.

C. Bad trimming. Not straight across and too short. Pressure on the end of a long nail makes the edges bend upward. The edge of the nail should rest on the hard skin at the end of the toe and not on the tender skin at the sides in the nail bed.

As a result of unfavorable surroundings the edge of the nail is forced downward and inward into the soft parts; the nail becomes thicker and more curved, an ulcer forms at the edge and infection with exuberant granulations follows.

When fully developed we have onychia and paronychia, i.e. an inflammation of the matrix and soft parts about the nail. This may occur in any toe but is most common at the outer side of the great toe.

The diagnosis is usually evident, but ringworm should be borne in mind as an occasional cause of error.

Prophylaxis consists in good shoes and stockings from birth.

Relief may be obtained from the milder varieties of ingrowing nail by purchasing longer shoes with a high soft cap, straight last, broad toe and low heel. In addition to this the best treatment for many of these nails is a thinning of the entire body of the nail by a small emery wheel such as is used in the offices of many chiropodists. This makes the keystone of the nail arch soft and flexible and prevents excessive pressure on the nail groove and also promotes outflaring of the sides of the nail. I know one individual who regularly prevents trouble each year by having his great toe nails ground down before starting off on a strenuous two weeks' golf trip.

If necessary the edge of the nail may be lifted by inserting cotton beneath it with the flat end of a probe. Foote advises wetting the cotton with 1:50 silver nitrate solution. Crane advocates dentist's base plate gutta percha which he claims pos-

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FIG. 1. Toe.

FIG. 2. Nail. Soft parts turned back.

FIG. 3. Matrix, Nail removed.

FIG. 4. Phalanx. Matrix removed.

FIG. 5. Incision for operation. Strip of nail and matrix removed.

FIG. 6. Nail removed to show amount of matrix that should be removed.

sesses decided advantages over cotton. A small triangular piece is cut and heated in the flame and then inserted beneath the edge of the nail. It molds itself to the shape of the nail and may be left until the nail grows in the correct direction.

For temporary relief, in an emergency, when much walking is necessary, a quarter-inch strip may be split up the entire side of the nail with sharp pointed scissors and the lateral piece pulled out or the offending corner only cut away. This is usually poor treatment as the pain and pressure will quickly recur as the nail again advances.

In mild cases with people of intelligence Foote recommends a thin strip of spring silver bent to hook under the edge of the nail and half encircle the toe to the plantar surface. It is held in place by adhesive plaster. As the patient steps on the toe the nail is lifted upward.

Radical treatment consists of removal of the side of the nail and the corresponding matrix by operation. This may be done under nitrous oxide anesthesia or by novocaine block. An elastic band is tightly drawn about the base of the toe to ensure perfect hemostasis. A vertical incision is then made about ⅜ inch from the lateral edge of the nail and parallel to the nail groove. This commences about ¼ inch below the joint surface, at the root of the nail, and is carried down to the bone by a single sweep of the knife, terminating at the tip of the toe and the free edge of the nail (Fig. 5).

Next the blade of the knife is inserted into the incision down to the bone and a lateral twisting motion carries the cutting edge laterally outward between the matrix and the bone, turning the matrix and soft parts upward upon a hinge. Then the tip of the matrix is grasped with a mouse tooth forceps and, with the point of the knife, is carefully dissected upward and outward, cutting it away from the bone and soft parts but taking a thin layer of the cutis with the matrix, especially at the upper end near the root because at that point the nail grows from cells "above and below" (Fig. 6).

No sutures are used. The flap of skin is carefully held up in place against the cut edge of the matrix and nail by a bandage, which is applied firmly but not too tight, before the elastic band is removed.

The dressing should be changed in a day or two after thorough soaking in an antiseptic solution and great care should be used not to tear the flap loose. Later a shoe with the cap cut away is worn and, finally, when healing has taken place (from one to three weeks, depending upon the amount of infection present) the patient is fitted with loose stockings and a long shoe with broad toe, high cap, low heel and straight inner line.

Other methods of treatment for ingrowing nail have been advocated. They may be also good but those described above will give satisfactory results if properly applied.

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OFFICE TREATMENT OF ENDOCERVICITIS*

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BROOKLYN

PREVENTIVE medicine is the order of the day. Most every individual and a great many organizations throughout the world are interested in the prevention of disease. Modernity requires this.

In the prevention of most of the infections of the cervix we must begin with the delivery of the child. Prevention at this time may be accomplished or minimized first by obtaining complete dilatation of the cervix before delivery, or attempts at delivery; secondly by keeping the membranes intact until full dilatation of the cervix is obtained; and finally by making the actual delivery of the child as nearly normal as possible. Dry labor is always more exhausting to the mother and likewise more traumatizing to the cervix. Under any condition, when a full-term child passes through a cervix, it is lacerated, either microscopically or macroscopically, usually macroscopically. The degree of laceration does not make very much difference so far as infection is concerned, because, as is well known, there are myriads of pathogenic and non-pathogenic bacteria in the vagina which immediately enter through such lacerations, whether they be microscopic or macroscopic. So that if we take plenty of time for complete dilatation of the cervix, preserving the membranes until full dilatation shall have been accomplished, we do all that is possible towards preventing trauma, and in the prevention of trauma we inhibit or minimize infection. Furthermore if moderate or extensive lacerations of the cervix are repaired immediately after delivery we minimize or prevent the entrance of infection. This should therefore be done when possible.

It must be remembered also that gonorrheal infection in the nulliparous cervix (multiparous too!) is a very common occurrence and calls for very active treatment.

With all our admonitions regarding the prevention of infections of the cervix, we still have chronic endocervicitis occurring in about 75 per cent to 85 per cent of the women seen in hospital and private practice.

How shall we treat endocervicitis? There are several recognizable groups of these cervices and it seems to me that the treatment can be more clearly outlined if we place all infected cervices into four groups, depending upon the pathology present. They are the following:

Group I. The recently lacerated cervix (of only four to twelve weeks' duration) with superficial infection.

Group II. The lacerated, eroded cervix of three to twelve months' duration, i.e. somewhat more deeply infected than Group I, with more or less eversion and few if any cysts.

Group III. The lacerated, everted, eroded cervix of two to five or more years' duration, i.e. moderately deeply infected and with or without visable cysts.

Group IV. The old lacerated, everted, cystic, usually eroded, cervix, deeply infected and of long duration (ten to forty years).

Now having arbitrarily divided all infected cervices into these more or less recognizable groups, let us proceed with the treatment for each group.

GROUP I. Often in this early group we find a retroverted uterus, few weeks postpartum, that should be corrected. When corrected and held in place with a

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pessary, involution of both uterus and cervix is stimulated and hence the cervical discharge is lessened. Local applications plished and the cervix is now a normal looking multiparous cervix free of infection and therefore of discharge. (Fig. 2, No. 4.)

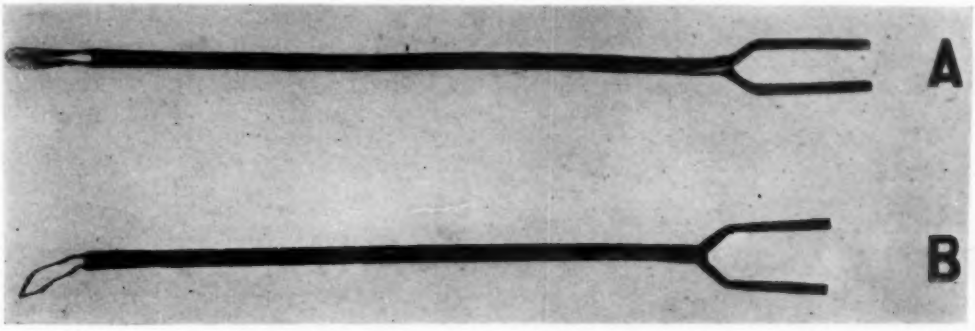

Fig. 1. Nasal type of cautery. *A*. Blade tip, generally used for striping or flat cauterization. *B*. Wire loop used for puncturing cysts. It may also be used for striping as in *A*.

of silver nitrate "stick" or 20 per cent to 40 per cent solution once a week, using an alkaline cleansing douche (sodium bicarbonate, borax, or sodium chloride, 4 drams to 2 quarts of hot water) once a day followed immediately by the knee chest position for five to ten minutes, will destroy superficial infections and promote kindly healing of the lacerated tissues. Tincture of iodine or 4 per cent to 10 per cent mercurochrome may be used with success. Far better, however, than any local applications, even in the treatment of these early cervical lesions, is the electric cautery. Using the small nasal type cautery with the small blade or looped wire (Fig. 1, *A* and *B*) "striping" the lacerated eroded surface (Fig. 2, No. 1). The "stripings" are placed about 1 cm. apart and extend 3 to 5 mm. deep, both lips being "striped" at the first sitting. In these early Group 1 cases merely cauterizing the "erosion" with the flat surface of the cautery blade often suffices. Mercurochrome 4 per cent should be painted over the cauterized cervix and a cleansing douche should be taken twenty-four hours later and repeated daily thereafter. I rarely use vaginal tampons in this type of office work having never been convinced of the accredited value of them. In two to four weeks there is no sign of erosion. Inversion rather than eversion has taken place. Healing has been accom-

Group II. In this group the infection has gone deeper into the cervical tissues, particularly the mucous membrane and glands, hence the topical applications are *absolutely useless*. Do not use them. The ideal and successful method is the cautery method. The technique of striping is the same as in Group 1, except that in this group the cauterization must be deeper and more extensive. Begin by cauterizing only one lip at a sitting. The striping must extend from high up in the canal (to or nearly to the internal os), out over and through the everted, eroded area to normal cervicovaginal mucous membrane, 1 to 1½ cm. apart and 5 to 7 mm. deep (Fig. 3, No. 1). The remaining lip may be cauterized in two weeks. When healing has completely taken place in eight to sixteen weeks we have a fairly normal appearing multiparous cervix with very little if any discharge. (Fig. 3, No. 3.)

A note of warning should be sounded regarding striping (cauterization) in the canal of the cervix, for if too much of the mucous membrane with its epithelial covering is destroyed epithelialization cannot take place in a normal manner and hence stricture and even stenosis will be the result. "Long islands" of epithelium must be left *in situ*, otherwise re-epithelialization of the cervical canal cannot take place. The pencil type cautery therefore should never be used in this type of work.

Group III. This is the borderline group. Oftentimes the cautery is not successful in this type of chronic infection with cyst formation. Experience counts a great deal in this group. Careful, thorough and deep cauterization is called for if success is to follow. For the beginner failure is likely. For one experienced in cauterization complete or partial success is pretty sure to crown his efforts. Some form of local anesthesia may have to be used, particularly for the inexperienced hand that misdirects the hot cautery tip and causes pain in an already apprehensive patient.

Furthermore there is likely to be some parametrial reaction following this type of cauterization and hence rest in bed for two or three days is in order. A warning must be given in this connection, viz: Never cauterize this group in the presence of acute or subacute inflammation. Marked systemic as well as local reaction sometimes follows. In fact in all cautery work acute inflammatory lesions in the pelvis are very strict contraindications to the use of the cautery. I have seen within the week a very acute fulminating parametritis as the result of cauterizing the cervix in the presence of a low grade subacute parametrial inflammation. Be very cautious and always try to eliminate such danger. Naturally any therapeutic agent can be misused by the man who does not know its limitations. Why blame the method? Diagnosis is still

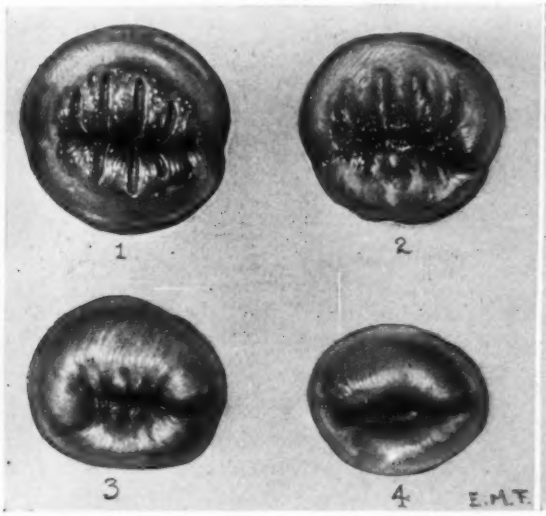

Fig. 2. Method of striping and process of healing. Cervix exposed and held in place by ordinary bivalve speculum. Small fine single tenaculum helps mobilize cervix, but is usually not necessary. Cautery tip (Fig. 1, *A*) heated to white heat (never blazing red) before making stripes or puncturing cysts.

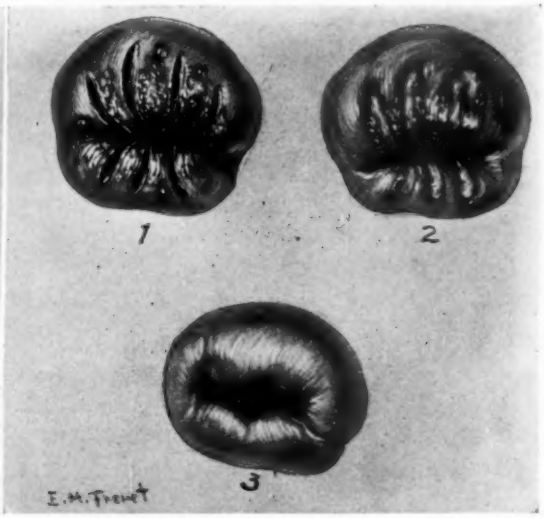

Fig. 3. Similar to Figure 2, except stripings are much deeper and cauterization generally more extensive due to longer standing and deeper seated infection. All visible cysts are punctured after method shown in Figure 4.

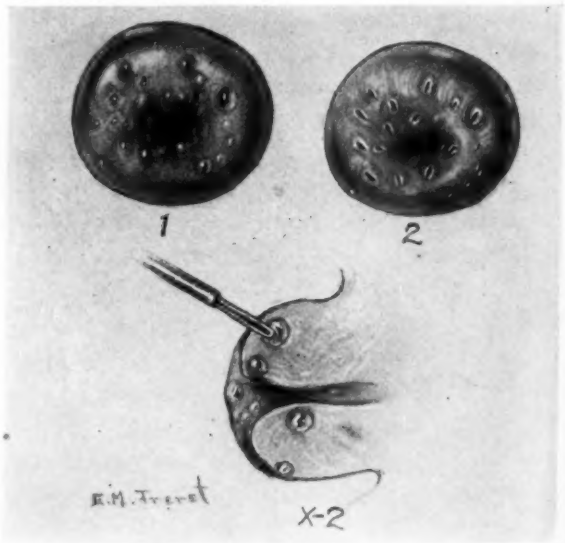

Fig. 4. Method of puncturing cysts. May be used alone or in conjunction with stripings as shown in Figures 2 and 3. This method is particularly applicable to nulliparous cervix, especially gonorrheal. Note small size of wire cautery tip. May also be used to destroy latent infection or abscess of Skeene's glands.

the most important phase of the practice of medicine, for without an accurate diagnosis no form of intelligent treatment can be carried out.

Group IV. We have now to say a word about Group IV. This is the hopelessly infected cervix of long duration that nothing short of the removal of the infected area by the Sturmdorf cone operation or by amputation will relieve the discharge. The cautery, that is the office cauterization, cannot remove the infected area and therefore will not relieve the leucorrheal discharge. Do not try the cautery in these cases. Operate upon them. Of course under full anesthesia it is possible to amputate a cervix with the cautery; however I prefer operation. Better healing and less scarring is obtained by operation.

The infected nulliparous cervix (gonorrheal or other infection) may be treated successfully with the cautery. In the earlier stages after all acute symptoms have subsided stripings similar to those for Groups II and III may be carried out. Any cysts may be punctured as illustrated in Figure 4. Early cases properly cauterized give excellent results. Late cases with many deep cysts are not so successfully handled with the cautery but are improved, depending upon the thoroughness with which the cautery is used. Since these cases often come for the relief of sterility as well as leucorrhea, any form of treatment that will give at least some relief is commendable. Operations on such cervices, especially amputation, is certainly not to be desired. In fact amputation of the cervix during the child-bearing age is absolutely contraindicated, except under very special circumstances.

In conclusion I should like to stress the following points:

1. Prophylaxis as regards the prevention of lacerations and infections of the cervix is most important.

2. In the recently lacerated and traumatized cervix, local applications of silver nitrate, tincture of iodine, 4 per cent mercurochrome and other germicidal agents, together with alkaline vaginal douches, inhibit but oftentimes fail to prevent the progress of the infection. The cautery works wonders. Try it.

3. For the early erosions and superficial infections of the cervix the cautery treatment, by all odds, gives the best results.

4. When the infection is of longer duration with cyst formation, the judicious use of the cautery still gives the best results in office work.

5. In the infections of very long durations, with deep seated infection and marked cystic formation, the cautery is of little or no use. Operation must be resorted to.

WARTS, MOLES & CORNS*

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WARTS and moles are worthy of serious attention by the physician and should not be considered as mere cosmetic defects to be treated by the beauty parlors. Corns are of much less importance and seldom require the aid of a physician. The recognition of warts, moles and corns is usually easy, though it is difficult at times to distinguish between certain types of warts and moles. In spite of the great frequency of these lesions we have much to learn of their causation. The majority of warts appear to be infectious though no specific organisms have as yet been discovered. Common warts at least have been experimentally produced by a filtrable virus. As to the cause of moles, we merely know that they show a marked hereditary and familial tendency. The real cause of moles, as of all other birthmarks, is unknown. Corns constitute a reaction to pressure and tend to remain as long as this continues. The chief interest in this subject is the treatment, which will be considered at some length.

WARTS (VERRUCAE)

There are several varieties of warts which present very dissimilar appearance, some of them (flat warts, plantar warts) often failing to be recognized as such by the average physician. A discussion of this subject will not include the verrucous changes that occur in certain skin diseases such as tuberculosis, nor will it include the infectious disease seen in parts of South America, known as verruga peruana. Six types of warts will be considered: common, filiform, plantar, flat, acuminate and senile warts.

1. The *common wart* (verruca vulgaris) is the familiar type occurring most often on the back of the hands or fingers of children. Like other types of warts it is a benign epithelial neoplasm and not an inflammatory affection. It is true, however, that warts may at times become secondarily inflamed as shown by a reddish areola and tenderness. Common warts vary in size from a pin head to a small bean and may become more or less confluent. They are sharply defined, have a rough mammillated surface which may become very hard in lesions of long standing. The base may be somewhat constricted and almost pedunculated. They may be single or multiple. While seen most often on the hands, they often occur in the nail folds and also on the face, scalp or any region, including the mucous membranes. The common wart may be associated with other types of warts and in rare instances may be the starting point of malignancy. While children are most often affected, the disease is also seen in young adults, less often in later years.

A variation from the classic common warts is known as the digitate wart, which consists of a "group of separated finger-like projections arising from a common base" (Pusey). This lesion differs from the ordinary type in its greater hypertrophy of the papillae.

In treating common warts it should not be forgotten that they eventually disappear spontaneously. They have been known to disappear apparently from the mental effect of suggestion. At any rate their duration is extremely variable and capricious. It is therefore proper to avoid scarring as far as possible in their removal, especially as the majority occur on exposed parts of the body. Massive doses of roentgen rays or radium, with close screening of the surrounding skin, will cure a minority of common warts. This method

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of treatment, if successful, is ideal, as it is painless, causes no scarring and affords no opportunity for infection. In a few cases of multiple warts on the back of the hands and fingers, I have seen the lesions disappear rapidly after a single dose of 1 "skin unit" roentgen rays, applied without screening the individual lesions. When irradiation fails I prefer to use electrodesiccation (monopolar Oudin current). With this method care must be taken to use a small spark which will not extend beyond the lesion to be treated. Local anesthesia may be used, especially for warts affecting the nail folds, where this method of treatment is decidedly painful. Great care must be used not to overtreat an anesthetized lesion and produce unwarranted scars. Caustic potash is a favorite remedy of some of my colleagues, the surrounding skin being protected with vaseline. I have not been successful with carbon dioxide snow, though freezing by liquid air, which is now easily obtainable, is highly recommended by Irvine. The latter uses this remedy intermittently for three minutes with success. Salicylic acid has long been used for warts, though my experience with this keratolytic agent has not been very satisfactory. I would certainly never recommend nitric acid, on account of its well-known tendency to produce keloidal scars.

2. The *filiform wart* (verruca filiformis) is a thin, flexible, thread-like body which consists of one or of several hypertrophied papillae. This type of wart may be single or multiple and occurs most frequently on the neck and face, often about the eyelids. It is easily removed by a sharp curette, after which the base should be cauterized with silver nitrate stick.

3. The *plantar wart* (verruca plantaris) is seen on the bearing surface of the feet (toes, ball of foot and heel). From a casual glance it resembles a corn or small callus. Careful inspection however shows it to consist of grouped filiform hypertrophies with a hard elevated border. Plantar warts are always painful, often extremely so, and interfere seriously with walking or dancing. They are single or multiple and may be associated with other types of verrucae. They are unquestionably communicable and often affect a large number of boys or girls in boarding schools. It seems probable that they are carried from one to another by walking barefoot in the gymnasium or swimming pool.

The best treatment for plantar warts in my opinion is by the roentgen rays, this method being successful in the majority of cases. It is my practice to give one exposure of 3 "skin units" of unfiltered rays, screening the individual lesion with lead foil as closely as possible. With this dosage it is not advisable to pare the lesions previous to irradiation. I have never seen any ill effects from this method, though it is not always successful and may have to be repeated once or twice after intervals of five or six weeks. When the roentgen rays fail, the lesions may be excised or removed by electrodesiccation or other destructive methods. The advantages of treatment by the roentgen rays are that there is no pain, no danger of infection and the patient is not compelled to remain off his feet for a week as after excision.

4. The *flat wart* (verruca plana juvenilis), as its name would imply, is seen most often in children, though it also occurs in adolescent girls and young women and in men upon the bearded region. The lesions are usually multiple and may be numerous, one or two hundred being present at times. Flat warts are of pinhead size with smooth or slightly scaly surface and round or polygonal base. They are mostly discrete but may coalesce to form small patches. The color is that of normal skin or slightly yellowish. Flat warts are often unrecognized as such and may be mistaken for lichen planus, though this disease is rarely seen on the face. These lesions, like other types of warts, are capricious in their course but always disappear spontaneously, after months or at times years. They cause no subjective symptoms and may be associated with other warts. Their

cause is unknown, though it is probably an infectious agent.

In the treatment of flat warts, it is always advisable to try internal administration of protiodide of mercury, originally suggested by C. J. White. This results in a cure of the majority of cases, at least in children, though in my experience it has not been successful in men. The drug is used in doses of ⅛ to ¼ grain, after meals. The lesions may be easily removed by a sharp curette, a method which I always use for the bearded region in men but hesitate to use in children. The roentgen rays are not successful in this type of verruca.

Fig. 1. Acuminate warts (condylomata acuminata). They may be satisfactorily treated by electric cautery under local anesthesia.

5. The *acuminate wart*, or so-called "venereal wart" (verruca acuminata), is also known as pointed condyloma in contradistinction to broad condyloma of syphilis. It consists of filiform excrescences which often coalesce and form large cauliflower-like growths which are more or less tufted and are constricted at the base. They occur on the sulcus or corona of the penis, or on any part of the vulva and may involve large areas including the anus, perineum, intergluteal fold and thighs. There is often a foul-smelling discharge and some soreness on motion.

Acuminate warts are auto-inoculable and extremely persistent if not treated. They occur where there is heat, moisture and irritating discharge and are seen chiefly in uncleanly persons. They were formerly thought to be due to gonorrheal infection. They are probably due to the action of various organisms though the cause is unknown. Their differentiation from broad condyloma of syphilis may sometimes be difficult. Acuminate warts are pointed with long filiform projections, whereas the condylomata of syphilis are flatter and arise from flat papules.

For the treatment of small acuminate warts, either the cautery or electrodesiccation is satisfactory. Large lesions are best removed by excision under general anesthesia. At times the lesions shrink and disappear under various applications such as permanganate of potash (1:2000) or lactic acid, 0.5 per cent. Local applications are, however, rather unsatisfactory.

6. The *senile wart* (verruca senilis), often called seborrheic wart, is a flat, scaly or warty non-pruritic lesion of varying size occurring especially on the scalp, face, trunk and back of the hands. The lesions are often multiple and may be extremely numerous, especially on the neck, back and chest. The color is some shade of yellowish brown. Senile warts occur in middle and old age and are comparatively harmless. Occasionally they may be the starting point of malignancy though less often than are flat senile keratoses of the face.

Senile warts are most easily removed by a sharp curette followed by the application of silver nitrate stick. They may also be satisfactorily treated by the roentgen rays, radium, electrodesiccation or other destructive methods.

MOLES

The term mole is somewhat indefinite but usually refers to a small pigmented nevus which may or may not be hairy. It also includes circumscribed, soft or firm elevations, which are not hyperpigmented. My conception of moles would not include any type of vascular nevus. While a mole is known as a birthmark it is not present at birth in the majority of cases and may not appear until adult life. Moles vary greatly in size, shape and number and may be single or multiple. They may be localized or may cover large areas of the body. Like other types of birthmark they may be unilateral and at times linear. The latter type, known as nevus linearis, is a papillomatous and verrucous lesion, at times covering large areas of the body. It is not suitable to include it in this discussion.

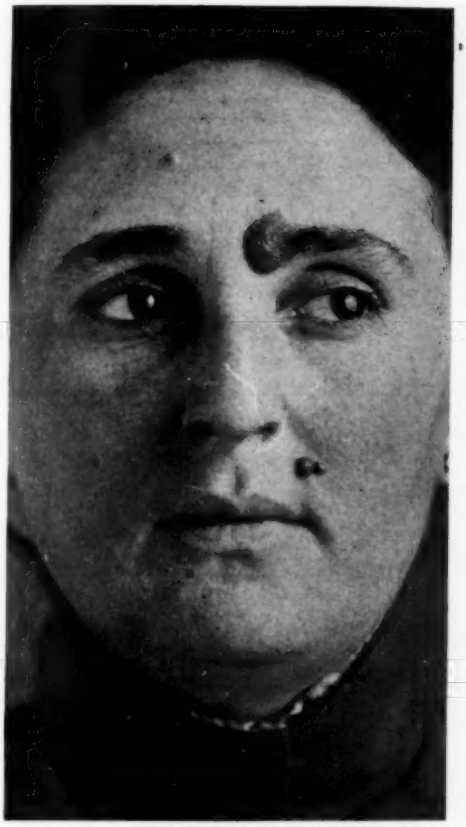

Fig. 2. Pigmented moles. Large lesion suitable for treatment by cautery, electrolysis or electrodesiccation. Smaller lesions best treated by cautery.

The pigmented mole may be flat, slightly raised or may form a circumscribed and partly pedunculated elevation. The color usually varies from a light yellowish-brown to a deep brownish black. The surface may be smooth or covered by a varying thickness of hair. The combination of pigment and hair is seen chiefly in the extensive lesions and may cover as much as two thirds of the body, as in the so called "bathing trunk nevus."

Fig. 3. Pigmented and hairy mole, not suitable for treatment on account of large extent.

The usual course of moles is to become stationary after attaining a certain size and to remain without change throughout life. They rarely cause subjective symptoms and as a rule constitute merely a cosmetic defect.

I do not believe that moles in general are a great source of danger and they should not be removed in a wholesale manner to avoid the possibility of later malignancy. There are two exceptions to this rule: When a pigmented nevus is in a situation where it is exposed to constant trauma, as on the bearded region in men, it should be removed. The same applies to a pig-

mented mole which is definitely increasing in size. In general the darkly pigmented moles, especially when covered by hair, may be safely allowed to remain. There is a type which should be radically destroyed or at least kept under careful observation. This is the bluish or slate colored, smooth mole which is not appreciably elevated. Such a lesion, if irritated by constant trauma or by improper treatment, may be the source of nevocarcinoma, one of the most rapidly fatal types of malignancy.

For the treatment of flat pigmented moles, it is proper to use electrolysis, electrodesiccation, the actual cautery or carbon dioxide snow, with or without local anesthesia. For very small pigmented nevi I have found the cryocautery of Lortat-Jacob convenient. This apparatus has various sized applicators by which the refrigeration can be confined to the desired area, whereas with a crayon of carbon dioxide snow, pressure is likely to allow the snow to spread beyond the border of the lesion. In small pigmented and hairy moles, it is advisable to remove the hairs first by electrolysis, before using one of the above-mentioned destructive methods. Large hairy moles are best treated by refrigeration or electrodesiccation. For the ordinary circumscribed elevated moles, whether pigmented or non-pigmented, I almost invariably use the electric cautery, being careful not to cause enough destruction to result in a depressed scar.

CORNS

A corn (clavus) is the familiar circumscribed lesion occurring usually on the outer aspect of the little toe, less often on the back of the second toe. It is a keratotic thickening, roughly conical in shape with the base looking outward and the apex extending inward and pressing on the nerves of the cutis. Corns are invariably painful and may become inflamed and even ulcerate. There are two types, hard and soft. The former has been described. The latter is usually situated between the toes and is soft from maceration due to heat and moisture. In association with corns, there may be a bursitis beneath or nearby, popularly known as bunion.

The treatment of an ordinary hard corn is unsatisfactory, as after removal it recurs when pressure is again applied. A time honored remedy is salicylic acid in collodion or ointment. The best treatment is prophylactic and consists in wearing properly fitting shoes and hosiery. Palliative treatment consists of soaking in hot water and soap, after which the lesion is pared and covered with adhesive strips or a protective ring-shaped pad. Soft corns may disappear when they are kept clean and dry. They should be washed frequently with alcohol and kept as dry as possible by dusting powder, such as talcum. If this procedure is not successful they may be destroyed by the cautery or by electrodesiccation.

SKIN CANCER*

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THE prevention and proper treatment of cancer depends principally upon education. During the last fifteen years an extensive educational campaign has been carried on against this malady and much good has been accomplished. Very little has been said, however, regarding skin cancer. Yet this form of the disease, if unrecognized and untreated, involves other organs in a large percentage of cases, and ends fatally.

It is the object of this paper to describe and set forth briefly the main points of diagnosis, and proper methods of treatment of epithelioma, which is a primary cancer of the skin. The discussion will not include other forms of cutaneous cancer which develop upon the skin secondarily from cancer situated elsewhere.

Epithelioma may be defined as an epithelial new growth with destructive tendency, originating in the epithelium of the epidermis or the glands of the skin. For practical purposes it may be divided clinically into three classes: the superficial, deep-seated, and papillomatous types. These three types differ only in their clinical manifestations.

Superficial Variety. The superficial form, sometimes known as the flat variety, is the most common. It may begin as a small, hard, brownish papule, as a wart-like excrescence developing from a wart, mole, small keratosis or greasy, scaly, seborrheic patch. The first evidence of epitheliomatous degeneration in any of the above lesions is usually an abrasion which does not heal, but gradually enlarges and becomes crusted over. After some months the degenerative changes displace the original lesion, and a deep ulceration forms which has a pearly rolled border with capillaries traversing it. The ulcer has a slight serous discharge streaked with blood. The course of superficial epithelioma is usually slow, and, while not of a very malignant nature, eventually of a very destructive; and there is a possibility in all cases of final glandular involvement or a change into the deep-seated type.

Deep-seated Variety. The deep-seated or nodular type of epithelioma may start from the superficial type or as a nodule in the subcutaneous tissue. It gradually grows larger, extending both downward and above the level of the skin. In a few months the nodule breaks down centrally, and an ulcer is formed which presents hard, everted, undermined edges, and which bleeds easily. The progress of this type is usually rapid. Muscle, cartilage and bone often eventually become involved and the neighboring lymphatic glands implicated. The internal organs may or may not have metastatic tumors.

Papillary Type. This variety usually arises from either the superficial or deep-seated type, but may begin primarily as a warty growth. When fully developed, no matter how it originated, the growth presents an ulcerated, fissured, papillomatous surface with a slightly inflammatory infiltrated base. Papillary epithelioma also develops a malignant tendency resulting in deep infiltration, involvement of the glands, and ending fatally.

CAUSE

While the cause of cancer is still undetermined, there are many contributing factors which should be borne in mind. As in other forms of the disease the tendency of epithelioma increases with age. Most epitheliomata occur after the age of forty, although cases in the young are by no means unique.

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Local irritation is an important etiological factor. An irritated wart or mole, or a neglected seborrheic patch, or keratosis is often the starting point.

Cancer of the lips, tongue and floor of the mouth is almost invariably preceded for some time by an unhygienic condition of the mouth and teeth, seen frequently in educated persons of otherwise cleanly habits.

The development of epithelioma upon other lesions of the skin is not uncommon, not only upon keratoses and leucoplakia, but also upon chronic varicose ulcers of the leg, or in the scars of lupus and syphilis. The occurrence of cancer in those exposed continually to the sun's rays has been often mentioned, and should probably be emphasized at this time when all forms of sunlight treatments are so popular.

DIAGNOSIS

The diagnosis as a rule is not difficult. The most characteristic features to be recognized are the hard, nodular, waxy border, infiltrated base, and the free bleeding of the lesions. Epitheliomata are generally single, in contradistinction to the lesions of lupus vulgaris and tubercular syphilis. The most frequent location of cutaneous cancer is on the lower lip, side of the nose, the cheek near the inner canthus, the buccal mucous membrane and the tongue. They may occur, however, on the backs of the hands, on the penis, in the vagina, or in fact any part of the body.

Lupus vulgaris generally occurs in the young, and the soft brown apple-jelly lesions would easily distinguish it from epithelioma.

A chancre sometimes looks quite like an epithelioma. The history, rapid appearance of the lesion, the finding of the spirocheta, and the subsequent appearance of the secondary manifestations and positive Wassermann reaction should easily settle the diagnosis.

Tertiary lesions are differentiated by their multiple lesions, serpiginous outline, and characteristic atrophic scars.

One other condition which is likely to be mistaken for epithelioma is pyogenic granuloma.

TREATMENT

The only correct treatment of epithelioma is complete destruction. Preliminary treatment with salves, pastes, or mild caustics only stimulates the growth of the lesion and lessens the chance of ultimate recovery.

The radical treatment of epithelioma may be carried out by currettage, followed by the application of caustics, the endotherm knife, exposure to the roentgen rays or radium, or by surgical excision.

Upon the surface of the skin, in my experience, the best method of treatment is by thorough currettage followed after all bleeding has been stopped by the application of acid nitrate of mercury for from five to twenty minutes, depending upon the extent and depth of the lesion. The acid is finally neutralized by bicarbonate of soda in powder form. This method is much surer to remove all outlying cancer cells, sacrifices less healthy tissue, and gives a much better cosmetic result than excision. Furthermore, there is less likelihood of reimplantation of cancer cells than by excision. While other caustics may be used with equally good results, I have found the acid nitrate of mercury the most satisfactory. I believe the method just described, except in certain selected cases, cures epithelioma more quickly and more satisfactorily than either roentgen rays or radium, although both these methods of treatment give excellent results in expert hands.

The endotherm knife is a method which has been used in more recent years, and possesses the advantages of the operation by currettage and caustic application. It will probably be much more widely used in the future.

In deep-seated epithelioma of the lip,

however, with involvement of the contiguous lymphatic glands, or in epithelioma of the mucous membrane, tongue, or floor of the mouth with glandular involvement, surgical excision of the epithelioma, preferably with the endotherm knife, with block dissection of the regional lymphatic glands, supplemented by the roentgen ray, is the only method that is justifiable.

SUMMARY

Epitheliomata are among the frequent and most important lesions of the skin.

Epithelioma in the beginning is a local condition and if thoroughly removed is curable in 100 per cent of the cases.

Skin defects such as moles, warts, scaly or crusted patches, and wounds which do not heal promptly, should be regarded with suspicion and treated promptly and thoroughly, especially if located in places subject to irritation.

Many such lesions, although they show no clinical evidence of degeneration, when removed prove to be cancerous under the microscope.

In all forms of epithelioma a certain amount of deceptive healing may occur. Superficial lesions may heal over completely and in the deeper forms even enough connective tissue may be formed to produce scars, but in such healings nodules of epithelioma are always left and sooner or later the disease recurs.

FISSURE OF THE ANUS & THROMBOTIC HEMORRHOIDS*

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FISSURE OF THE ANUS

A SIMPLE fissure is a longitudinal rent in the mucocutaneous lining of the anal canal, characterized by intense pain during and especially after the act of defecation. As fissure constitutes about 8 per cent of rectal diseases, its prompt recognition and proper management are of importance. Fissure commonly occurs in adults, more frequently in children than is recognized, but only seldom in the aged when the anal sphincters tend to relax. The lesion may be situated at any point in the anal ring, but in a typical case it is single and situated in the posterior commissure. In men about 1 per cent of fissures are in the anterior commissure and in women about 8 per cent are at this point. Exceptionally women especially have an anterior and a posterior fissure.

The immediate exciting cause is usually trauma, commonly by the passage of a hard scybalum, the clumsy use of a syringe tip, unskilled prostatic massage, and frequently it follows parturition.

In its acute early stage a fissure is usually superficial, but it may extend through the mucosa to the sphincter muscle. Unless an acute fissure is relieved, local infection tends to produce a fibrous induration of its margins which may become undermined, resulting in the so-called irritable ulcer. Consequent to the local infection, a skin tab frequently develops at the outer end of a chronic fissure. Although not hemorrhoidal, this is known as the "sentinel pile" of Brodie and, when present, is a sure indication of fissure. The highly sensitive nerve terminals involved in the fissure are irritated, resulting in spasm of the sphincter muscles which, together with the fear of pain at stool, induce or increase constipation, and lead to stasis toxemia. Extension of infection through the base of a fissure is a common cause of abscess and consequent fistula.

The cardinal symptom is exquisite pain, beginning usually with the passage of a stool and lasting from a few minutes to several hours thereafter as a dull ache or throbbing. The stool may be blood-streaked and accompanied by a few drops of fresh blood. Because of the close association of the nerves supplying the anal canal and the urogenital organs, reflex symptoms of dysmenorrhea, dysuria or vesical retention may be misleading. Likewise, pains referred to the iliolumbar and sciatic nerves may lead to the erroneous diagnosis of lumbago or sciatica.

The typical history usually furnishes the correct diagnosis. Nevertheless, a local examination should always be made. Its successful accomplishment is a tribute to the gentleness and skill of the examiner. With the patient in the Sims' position the buttocks are retracted. A "sentinel pile" is an almost infallible sign of a fissure situated immediately above it. A fissure or at least its lower margin can usually be seen between the radiating folds, but it may be obscured by hemorrhoids or edema of the mucosa. Local tenderness and sphincter spasm may bar digital examination unless sensation is dulled by the application of anesthesin to the fissure or the injection of 1 per cent novocaine solution beneath it. Full exposure of the lesion is best obtained by the introduction of a Brinkerhoff or similar

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speculum, placing the slide toward the fissure. If an abscess complicates the fissure, digital and instrumental examinations should be deferred until the administration of an anesthetic preliminary to the necessary surgery.

In the treatment of fissure the error is frequently made of constipating the bowels. Regular daily action should be obtained by a generous mixed but bland diet. One-half ounce of liquid petrolatum is taken night and morning and a retention olive-oil enema of 4 oz. is administered through a soft rubber catheter on retiring to soften the first portion of the stool. After defecation the patient should take a hot sitz bath of normal saline solution for ten minutes and rest until the pain has subsided. An acute fissure, seen within one to three days of its occurrence, may be cured frequently by the application every other day of pure ichthyol on a glass rod or 3 per cent silver nitrate in spiritus aetheris nitrosi.

In 1924 and again in 1926, A. B. Graham reported the successful use of quinine and urea hydrochloride in 77 per cent of 128 cases of fissure. I have found it equally satisfactory in many cases, especially in the acute stage. The technique is simple and readily carried out in the office. A *freshly prepared* 5 per cent aqueous solution of the drug is injected just beneath the fissure. The needle punctures the skin just below the lower margin of the fissure and as it is slowly advanced a total of 1 c.c. of the solution is deposited. The drug produces a fibrinous exudate which isolates the fissure, and anesthesia which is prolonged over several days. Unless a single injection is effective, the treatment may be repeated.

Benacol solution injected in the same way, we have found to be equally efficient. As a sentinel pile, if present, prevents drainage and so healing of the fissure, it should be novocainized and ablated.

Another simple office measure, sometimes curative, is to anesthetize the parts and then to pass a small needle-pointed cautery or the endotherm knife through the entire bed of the fissure.

Divulsion of the sphincters will usually cure a fissure, but in the chronic indurated variety the lesion should be excised at the same time. Anesthesia is by ether to the point of surgical narcosis, or by transsacral block with novocaine. Mechanical dilators are no substitute for the fingers which gradually stretch the muscles in five to ten minutes until the orifice remains patulous. Sphincter tone is regained in two or three days.

Incision is the most satisfactory method of treating a chronic fissure and always results in a cure. After the parts are infiltrated with 1 per cent novocaine solution, the buttocks are retracted and an incision is made through the bed of the fissure and out through the skin 3 or more centimeters. The external sphincter is divided superficially at a right angle to its fibers until the finger slips easily into the rectum. The margins of mucosa bordering the fissure are excised and the incision is packed with superimposed layers of vaseline gauze. The bowels are moved on the third postoperative day by an oil enema which releases the packing. The wound is cleansed after every stool with hot water or a sitz bath and is dressed every third or fourth day until healing is complete, which should be in about two weeks.

THROMBOTIC HEMORRHOIDS

Thrombotic external hemorrhoids are caused by a strain or traumatism of the engorged external hemorrhoidal veins, such as effort at stool, violent physical exercise and coughing or sneezing. Rarely the vein is thrombosed, but as a rule all coats of the vessel are ruptured and the blood accumulates in the connective tissue as a single large clot or several small clots beneath the tense shiny skin at the anal verge. The patient experiences a sense of local swelling and discomfort which very soon becomes a severe constant pain, often throbbing in character, and aggravated by pressure or defecation. A tight spasmodic sphincter

ani aggravates the pain which is due to the pressure of the clot on the numerous sensory nerve endings in the perianal skin. sitz baths and wet compresses of lead and opium wash, magnesium sulphate or boric acid solution may result in resolution of

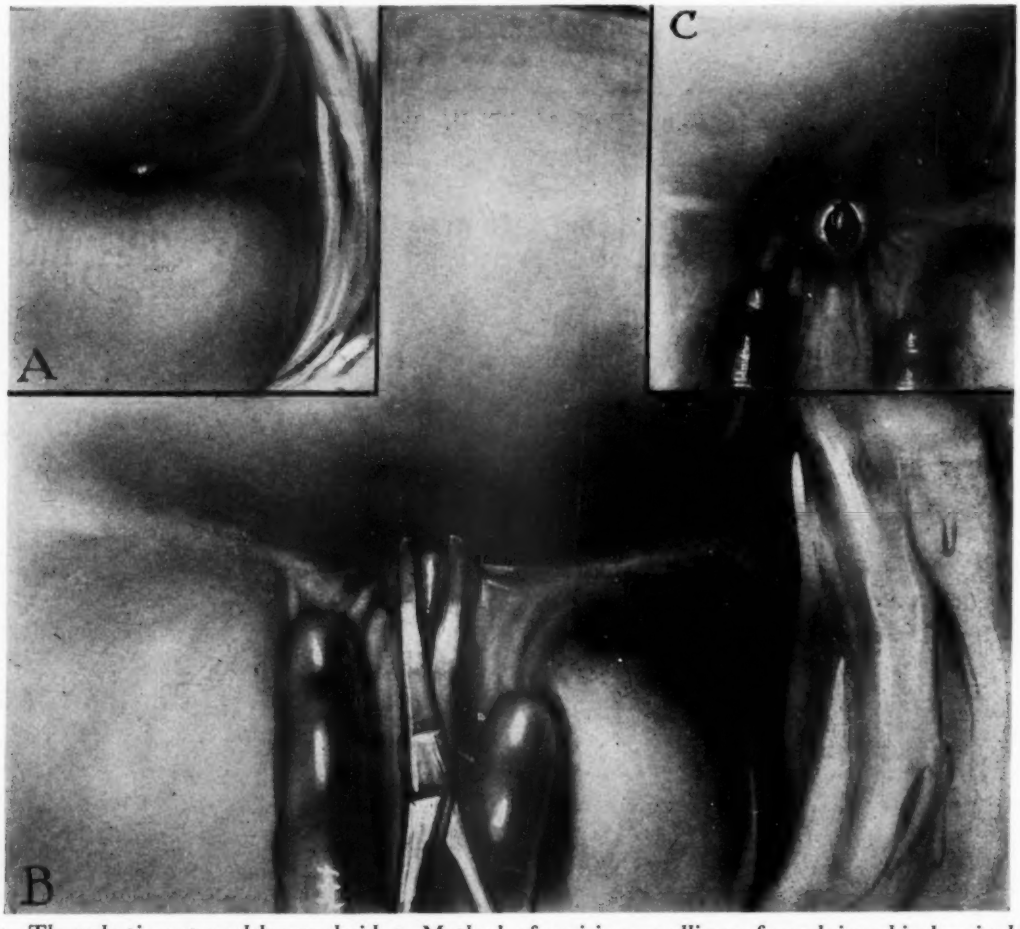

FIG. 1. A, Thrombotic external hemorrhoid. B, Method of excising an ellipse of overlying skin by single clip of scissors curved on flat. C, Clot protruding through incision. (From Yeomans' "Proctology," D. Appleton & Co.)

Unless obscured by edema, inspection reveals an ovoid, bluish swelling, the size of a grape or smaller, which to palpation is firm and tender.

A small clot may undergo resolution in about ten days, but usually a shot-like induration persists or, as a result of irritation, an annoying skin tab forms. If the clot is larger, and especially when it extends upward beneath the anal lining, pressure necrosis frequently ensues, followed by bleeding and retention or expulsion of the clot. Infection may occur, resulting in an ulcer or superficial fistula.

Treatment. Ointments and suppositories are useless palliative measures, but hot small clots. Because of the prolonged treatment necessary, the avoidable suffering and uncertain outcome, palliative measures are a poor substitute for a minor operation which gives prompt relief.

After applying tincture of iodine, the skin over the tumor is infiltrated with 2 per cent novocaine solution. Then, with a sharp, slender scissors curved on the flat, an ellipse of skin is excised by a single cut, extending from the outer to the inner margin of the thrombus. Usually the clot delivers itself spontaneously, but, when retained, the scissors are insinuated, snipping the surrounding connective tissue as necessary until it is freed and evacuated

intact. Nothing other than the sterile scissors enters the wound. The margins of the incision close in accurate apposition and a sterile compress applied firmly to the wound for a few minutes controls the slight bleeding. A small compress is then retained firmly in place over the wound by a strip of adhesive tape 15 in. long and 1 in. broad, running from the inner side of the thigh, close to the anus and upward over the buttock to the loin. The operation is painless, but local smarting or burning may last an hour or two after the anesthetic wears off. The dressing is removed after twenty-four hours and the wound is sponged with hot water on absorbent cotton after each stool. No further bandaging is required, but the wound is protected by a small pledget of absorbent cotton dusted with aristol. Primary healing of the wound usually follows this technique and in a week the scar is barely visible. Detention from business rarely exceeds one day.

When the tissues are infiltrated with numerous small clots, it is good practice to ablate the entire mass and to treat the site of removal as an open wound.

Thrombotic Internal Hemorrhoids. Occasionally circumscribed thromboses occur in the venous radicles of the superior hemorrhoidal vein, under the same conditions as produce clotting in varicose veins in other situations. At other times, fecal or other trauma may cause the diseased veins to rupture, the extravasated blood forming a more or less extensive clot in the submucosa. The patient experiences a sense of fullness, weight and sometimes throbbing in the lower rectum.

Digital examination detects, just within the rectum, an irregular, tender, boggy swelling. This may suggest an abscess, but in thrombosis the onset is usually more abrupt, tenderness is less marked, and elevation of temperature and leucocytosis are absent. This differentiation is very important therapeutically. Abscess requires immediate operation, whereas thrombosis usually subsides in a few days under rest in bed and antiphlogistic measures, among the best of which are rectal instillations of warm olive oil.

If pressure necrosis of the overlying mucosa and infection occur, treatment is the same as for abscess in this situation.

ADHESIVE PLASTER STRAPPING*

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NEW YORK

ADHESIVE plaster strapping may be advantageously used for many disabilities occurring in ambulatory patients. Its employment should be restricted to those cases in which a short period of treatment, usually not more than two weeks, may be expected to achieve a result. Longer periods of continuous strapping are usually not well tolerated by reason of skin irritation, although skin tolerance varies considerably.

TECHNIQUE

Zinc oxide adhesive plaster rolled on 1 and 2 inch spools answers practically all purposes. Plaster with a flimsy "body" is unsatisfactory. The part should be shaved dry. The strips should be evenly applied, all wrinkles being smoothed out with the thumbs as the strips are applied. In this manner a smoothly fitting dressing may be applied around bony prominences and other irregularities of contour.

USES

The primary purpose of an adhesive plaster dressing is that of ambulatory splintage of a more or less efficient sort, depending upon circumstances. The desirability of such splintage may arise from the following therapeutic indications:

1. To restrain activity.
2. To support a temporarily weakened part.
3. To exert pressure.
4. To "sling" a muscle.

These indications nearly always overlap, but usually one of them determines the precise nature of the dressing to be applied.

SOME COMMON CLINICAL TYPES

Foot Strain, "Flat Foot."—This is the commonest disability encountered in urban societies. These patients seek immediate relief and no matter what ultimate therapeutic measures may be contemplated, such relief can be afforded them by strapping.

The patient is to hold the foot dorsal flexed, moderately inverted, and with the toes flexed. In this attitude the tendon of the tibialis anticus stands out prominently. The strapping is applied as illustrated in Figure 1, thus supporting the long arch by an adhesive plaster sling whose point of fixation is the skin of the inner side of the leg.

Anterior Metatarsalgia, Morton's Toe.—When the symptoms are limited to the front part of the foot, as they more often are in women, the anterior arch may be supported by a felt pad placed just behind the metatarsal heads. The toes should be flexed, and the encircling straps should mildly compress the front part of the foot (Fig. 2.)

Strain of the Tendo Achilles Insertion, Achillobursitis. This exceedingly troublesome and disabling condition can nearly always be relieved by a period of strapping. The object is to restrain the activity of the calf muscle. It is important therefore that the strapping be applied with the foot in plantar flexion. The strapping is begun at the middle of the foot and is carried to a point above the belly of the calf muscle (Fig. 3.) The heel of the shoe is to be raised ¼ to ½ inch during the period of treatment.

Sprains and Minor Fractures about the Ankle.—Certain cases of malleolar fracture in which there is little or no tendency to displacement of the fragments can be made ambulatory after the first few days. After the initial swelling has somewhat subsided, a strapping may be applied.

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Fig. 1. Dressing for flat foot.

Fig. 2. Dressing for metatarsalgia.

Fig. 3. Dressing for achillobursitis.

Fig. 4. Dressing for sprains and minor fractures about the ankle.

The foot should be held in the attitude described for the strapping of a flat foot, but the strapping should be somewhat more extensive, as shown in Figure 4.

Strain of the Knee Joint, Acute Traumatic Synovitis.—With the knee held in extension, alternately crossing strips are applied from well below the tibial tubercle

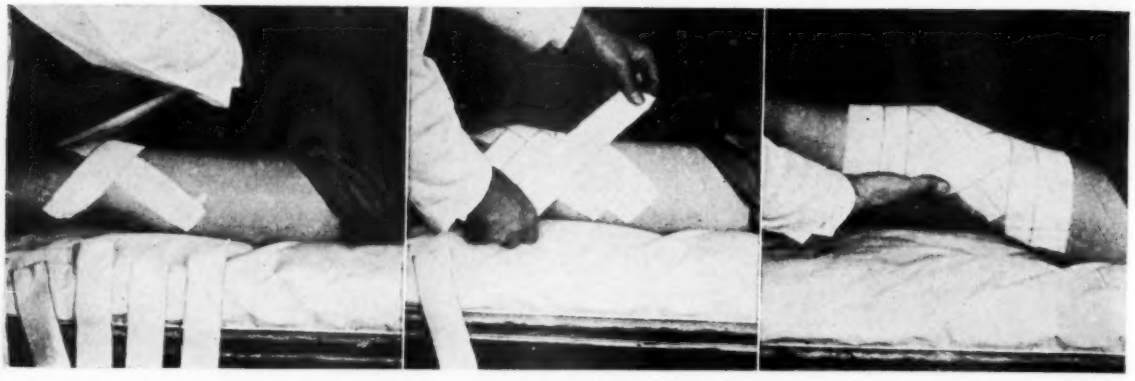
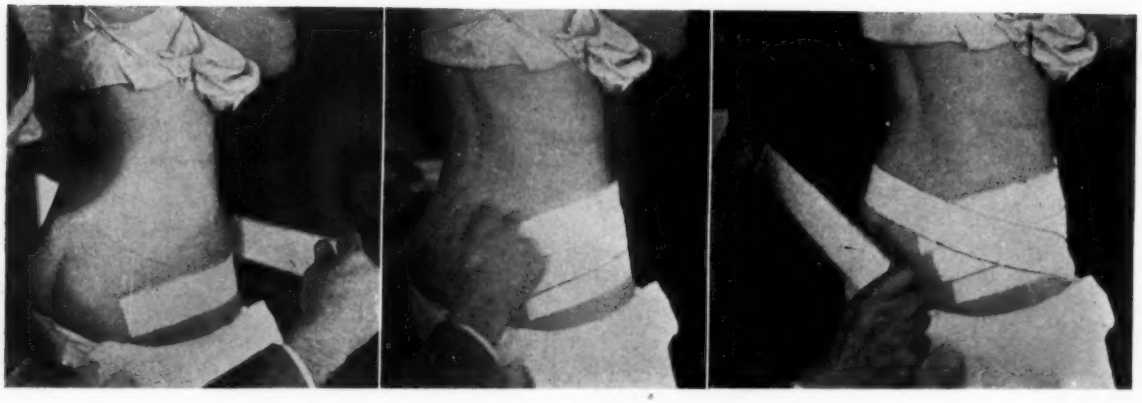


Fig. 5. Dressing for knee joint.



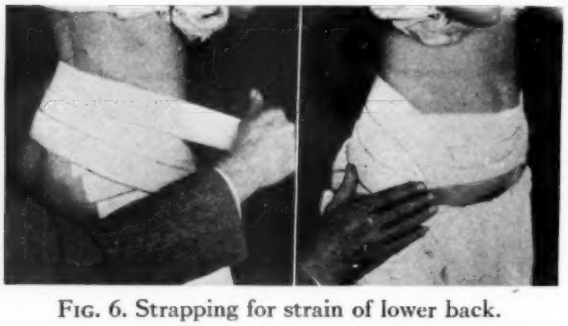


Fig. 6. Strapping for strain of lower back.

to the upper third of the thigh. The strapping should not entirely encircle the limb, about one quarter of its circumference being left free posteriorly (Fig. 5).

Strain of the Lower Back.—In order to be effective, the strapping should entirely encircle the lower part of the trunk. It is unsatisfactory in obese patients. The patient stands with the abdomen retracted; the surgeon is seated behind the patient. Three 2 inch strips are applied anteriorly, the lower limit of the dressing extending practically to the level of the trochanters. The posterior strips are then applied. These should extend well forward of the anterior superior spine on both sides, and they should be applied under some tension, as though the effect to be obtained were a compression of the sides of the pelvis.

EXPLORATORY THORACENTESIS*

A BRIEF OUTLINE OF THE INDICATIONS AND THE TECHNIQUE OF ITS APPLICATION

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THE proper technique of exploratory thoracentesis or therapeutic aspiration is universally too little understood and much too frequently carelessly performed. In many of its applications there is little thought given to the essentials necessary or to the complications that may result from lack of knowledge of this very important diagnostic or therapeutic measure.

When contemplating thoracentesis there are several fundamental principles to be adhered to: protection of the patient, selection of proper instruments and avoidance of complications.

Exploratory thoracentesis is performed for the purpose of determining the presence or location of a pleural effusion and its character, and is most often applied during metapneumonic or postpneumonic infections as an aid in the diagnosis of empyema.

If observed as a preoperative precaution in operations for empyema such errors as thoracotomy or costectomy upon patients with massive pneumonia, where percussion dullness is evident from apex to base, and operation upon the well side of an empyema patient, would be avoided. Such errors are known to have occurred.

TECHNIQUE

If possible have a roentgenogram taken of the thorax. Examine the chest carefully for signs and location of fluid and determine as accurately as possible the point of maximum dullness. Observe strict surgical asepsis in preparing the skin of the patient from the sternum to the spine and from the clavicle to the costal arch, employing 3 per cent tincture of iodine followed by alcohol. Drape the field with a sufficient number of sterile towels and sheets. A sterile gown and gloves should be worn by the operator. Needles, syringes and solution for local anesthesia should be thoroughly sterilized.

These preliminary steps will minimize the danger of carrying infection from without into the pleural space and accidentally producing empyema where none existed previously.

The next step is to anesthetize carefully the point of election with sterile 1 per cent novocaine solution, beginning in the skin by producing a wheal with a fine hypodermic needle and carrying the anesthesia slowly down to and including the parietal pleura, changing to a longer fine needle if necessary and always forcing the anesthetic ahead of the needle as the point advances.

Select an aspirating needle 4 cm. in length, of about No. 20 gauge and first pass the point through the skin. Then attach the needle to a 20 or 30 c.c. Luer syringe, *with the piston pushed all the way in.*

With the left hand resting on the chest and the thumb and index finger grasping the shoulder of the needle, the needle is slowly forced through the thoracic wall under guidance and control of the left thumb and finger and as it passes between the ribs, traction is made on the piston with the fingers of the right hand so that when the point of the needle enters the pleural space, fluid if present will immediately flow into the syringe.

The probable thickness of the thoracic wall should be estimated and if fluid is not found the needle should not be passed so

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deeply that it will enter the lung. If the lung is infected there is danger on withdrawing the needle of contaminating the pleural space and producing empyema. This is especially true where lung abscess exists. Where pneumothorax is already present as determined by physical signs or roentgenographic examination, the needle may slowly be passed deeper into the pleural cavity until the level of fluid is reached.

THERAPEUTIC ASPIRATION

If during thoracentesis it is desirable to remove a quantity of fluid, a Potain set may be employed, or an aspirating needle may be connected to the syringe by a piece of rubber tubing several inches long and fitted with suitable adaptors; and when the syringe is disconnected for emptying, *the tube should be clamped* to prevent air from passing into the pleural space and producing a pneumothorax.

If an adaptor is not at hand and it is necessary that fluid be removed at that time, the needle may be partly withdrawn until the point rests in the tissues of the thoracic wall each time the syringe is disconnected for emptying.

When pneumothorax follows exploratory or therapeutic thoracentesis, all physical signs are modified.

PLEURAL REFLEX

It has been reported that on rare occasions syncope or death has followed exploratory thoracentesis, especially of a healthy pleural space where no effusion was found. This is believed by some to result from shock produced by puncture. The more rational belief, however, is that it is due to an air embolus and may be caused by either of two ways: one, by communication established between a bronchus and a blood vessel brought about through injury by an aspirating needle; the other, by air passing through a deeply inserted aspirating needle into a blood vessel in the lung, either through an open needle or by air being forced in by a syringe from which the piston has been partly withdrawn.

While this may be only theoretical it is best to observe every precaution. For this reason, it is very important to see that the piston always reaches to the bottom of the aspirating syringe before being connected to the needle, the point of which has first been permitted to pass through the skin only. When fluid is present, the lung is forced away from the parietal pleura and a carefully inserted needle does not pass through the visceral pleura.

STRANGULATED HERNIA*

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THE strangulation of any hernia converts a condition compatible with life, if not comfort, into one fraught with peril. This transition, depending on many factors, is rapid, stormy. It demands prompt recognition, sensible treatment.

The common varieties as seen in routine hospital practice are inguinal, femoral, umbilical and incisional, the last presenting an increasing incidence because of the greater number of abdominal operations. Without attempting a statistical study, not germane to the purposes of this article, the writer's impression is that strangulation of the umbilical, incisional and femoral hernias is more often encountered than inguinal. This is perhaps due to the fact that the first three occur mostly in women whose household and family duties keep them so busily engaged that they cannot spare time for operation. The inguinal hernia is the man's hernia. Interfering with his capacity for work, or, indeed, to get work, he seeks operative relief more promptly, decreasing the total number of inguinal hernias about and incidentally the percentage of strangulation.

As in managing any ailment to which the human machine is susceptible, the first step is to diagnose it. In the first instance a clear understanding of what constitutes strangulation is necessary. Curiously, there is often lack of that understanding. Hernias may be irreducible, incarcerated or strangulated. An irreducible hernia is self-explanatory. If its content be bowel and the fecal current is shut off, then it is incarcerated. If, in addition, its blood supply be cut off, it is strangulated. Hernias may also be inflamed. That is, the usual signs of inflammation are present in the skin overlying a hernia. Such hernias are often mistakenly regarded as strangulated.

Symptomatology when strangulation occurs is variable, but there are two outstanding symptoms consistently present. One is pain and the other is that somewhere on the facade of the body appears a lump which cannot be pushed back into the belly; or that a lump which previously could thus and there be pushed, now becomes recalcitrant. The pain is severe, prostrating. Generalized at first, it soon localizes in the hernial vicinity and continues until the hernia is reduced or the contents become gangrenous, when it diminishes in degree only.

Vomiting is variable, but practically always present. Its character and severity depend on what is caught in the sac. If it happens to be small intestine, the vomiting is prompt. The higher up the intestinal pathway, the more prompt and severe is the vomiting. On the other hand, if the content is omentum, vomiting does not ensue so rapidly or so severely. The vomitus is gastric, duodenal and intestinal successively, as the gut, cephalad to the strangulation, struggles to relieve itself of its imprisoned contents.

Obstipation supervenes at once, although a bowel movement often occurs shortly after the strangulation occurs, representing expulsion of fecal material in the lower bowel. If the hernial content is omentum, bowel movements may occur. Flatus, obviously, concurs with the solid matter.

Temperature and pulse show but little elevation at the inception of the attack.

Careful examination of the hernia is most helpful in arriving at a determination as to the existence or non-existence of strangulation. *En passant*, it is well always to remember that in the aged small femoral hernias may exist without attracting the patient's attention and when strangulated may be very easily

* Submitted for publication February 14, 1929.

overlooked by the physician unless the femoral regions are carefully palpated. In all patients suffering from abdominal cramps and vomiting the possibility of strangulated femoral hernia must ever be kept in mind.

In examining a given hernia the immutable rules should be followed: look, feel, percuss, listen. The senses involved in the combination yield much valuable information.

Inspection defines location, size, shape, presence or not of inflammatory signs in the skin, be they resultant on what has gone on inside the sac or on outside influence such as a truss, intertrigo, or too zealous use of heat; visible peristalsis, an observation of value in determining whether strangulation exists or not. If present, the gut is probably not strangulated.

Palpation yields much that is important. Our tactile sense informs us as to the tension of the hernial mass, always marked in strangulation, its reducibility, nonexistent if strangulated, as is a cough impulse. It also conveys the consistency of the mass: hard, "doughy," if omentum is caught; softer, more fluctuant, if it is bowel; frankly fluctuating in late cases when either pus or fecal matter is free in the sac, following gangrene and perforation. The degree of tenderness is noteworthy, always more pronounced in strangulation than incarceration. Careful palpation helps to estimate the extent of the extruded viscera, absolutely and in relation to the peritoneal opening. In the ventral cases, i.e., umbilical and incisional, the hernial content may be extensive yet present a relatively small peritoneal opening. Such hernias "mushroom" under the skin, usually contain omentum, and if strangulation occurs it is due to a knuckle of bowel caught at the ring. The smaller the ring the greater the danger of strangulation. A strangulated femoral hernia with not more than 2 in. of imprisoned small intestine is generally more serious than a huge ventral hernia. Palpation will often aid in differentiating between acute intestinal obstruction within a hernial sac and within the abdomen at or near the neck. This is not an infrequent occurrence and is especially noted in the very large inguinal and incisional hernias.

Percussion is useful in arriving at a conclusion as to whether bowel is in the sac or not. If the note is tympanitic, there is bowel; absence of a tympanitic note does not exclude the presence of bowel, as overlying omentum will conceal intestine.

Auscultation is an important aid in determining if strangulation has involved the intestinal tract. Exaggerated peristaltic sounds may be heard on careful listening with the stethoscope and may often be followed down to the hernial sac, where they abruptly cease.

Having thus utilized some of the special senses and having arrived at the conclusion that the hernia is strangulated, what next?

Naturally, one's first thoughts are conservative and efforts are directed to effect reduction by taxis. To this end the foot of the bed is raised, the hip and knee joints are flexed, and *careful, gentle* pressure is made in such a way as to return the escaped viscus to its home. The patient from long experience may often accomplish this maneuver much more expeditiously than the doctor. He derives double satisfaction in that he has relief and has put one over on the doctor. Internal rotation of the flexed thigh is often helpful in reducing an inguinal hernia. Local application of heat is frequently useful. Infiltration locally, with ½ per cent procaine may be of service in facilitating reduction. A hypodermic of morphine is useful. These methods apply only to the patients seen early. Strangulation existing over a period of hours is best managed by open operation, the sooner the better. No patient dies from being operated on too soon.

At operation, two major problems present. The first is to save life, the second is to cure the hernia. Both may be difficult, depending on the findings.

In the pre-operative management too

great emphasis cannot be laid on the necessity for emptying the stomach. Between intake, unless peremptorily shut off by the doctor, and the back-spill from the bowel, the gastric viscus becomes a cesspool. Siphonage saves lives. A mistaken sense of consideration because of the discomfort engendered by a stomach tube often prevents its use. It is far more essential than the rectal tube, which is so industriously and, as a rule, ineffectively applied.

Choice of anesthetic has an important influence on the result. Most strangulated hernias may be successfully managed under local anesthesia, using procaine by infiltration, or field-block. Spinal anesthesia has a field of usefulness as has nitrous oxide-ethylene among inhalation anesthetics.

The operative procedure is, of necessity, determined by the condition found. The hernial sac should be exposed, freed, opened, and the site of strangulation uncovered and dealt with as needed. If incision is necessary it is well to keep in mind in inguinal hernias the location of the deep epigastric vessels, and cut up and out; and in femoral hernias to confine one's efforts with the scalpel to the mesial aspect of the femoral canal, and divide Gimbernat's ligament.

Further steps take one to the sac content. Gangrenous omentum is to be ligated and excised. If the content be bowel careful scrutiny of it and its mesentery is necessary to estimate the local damage. What is the color of the gut, is the serosa intact, is there visible peristalsis, is there evidence of thrombosis of the mesenteric vessels? Their presence, or absence, respectively, together with the general condition, constitute the basis on which decision to resect, or not, will rest. This decision is difficult and has great bearing on the mortality. Generally speaking, resection is to be avoided if possible. If found necessary, it should be done most rapidly and the bowel proximal to the obstruction emptied by suction and drained by means of a rubber tube implanted by the so-called Witzel method. The tube brought through the operative wound, or a stab wound, is to be connected with a bottle. It serves as a vent for gas and for retained fecal matter of high toxicity.

Having completed whatever work is needed within the sac, it is to be ligated, divided, excised and plastic repair of the abdominal wall effected. In incisional and umbilical hernias imbrication is the standard method; in the inguinal group, fascial repair, i.e., the suture of homologous structures, is the ideal to be sought; in those arising in the femoral canal, obliteration of the femoral opening by suture of the ligaments of Poupart and Gimbernat and of pectineus fascia is usually sufficient.

If operative procedure has been prolonged or extensive or there has been much tissue trauma, it is wise to drain the wound.

Postoperative management may be simple or may call for close watching and active treatment. Those patients who have been operated on promptly without the necessity of bowel resection offer no greater problem as a rule than uncomplicated hernioplastys. On the other hand, patients operated on late, who have had resection, are likely to have a stormy course. Their needs are best met by frequent use of the stomach tube, preferably siphonage, i.e., emptying without lavage; morphine for pain or restlessness; water salt and sugar. Water by mouth; salt solution 0.9 to 3 per cent subdermally, intravenously, per rectum, and 10 per cent glucose intravenously meet the physiological requirements.

The very late cases with signs of frank intestinal obstruction are best managed by jejunostomy, or ileostomy, under procaine anesthesia, combined with the measures mentioned above which are designed to eliminate toxic gastric accumulations, to restore the diminished blood chlorides by salt solution and to furnish nutriment with glucose. If they can be tided over until the general condition improves direct attack on the hernia can be initiated with much greater assurance of success.

LOCAL SURGICAL TREATMENT OF INFECTIONS OF THE FACE*

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NEW YORK

DURING the past few years articles have been published calling attention to the possible fatal outcome of acute infections of the face. While this may be true of infection starting in any portion of the body, the rapidity with which an apparently simple local infection can become a severe or even fatal infection, has been described as a peculiarity of facial infections. This is graphically brought out by a quotation from one of these writers: "A friend had a pimple in the nose. On Saturday morning he went to see a well known specialist who opened the pimple. On the following Tuesday morning he died." It is hard to believe that so rapid a fatal outcome could have followed if the pimple had been on the arm or chest or any part of the body other than the face.

The explanation must lie in some difference in the anatomy of the face, and particularly in the center of the face, which may favor the spread of an infection into the deeper parts. The intimate attachment of the muscles to the skin, and the consequent absence of a well-marked subcutaneous layer of fat, with a layer of fascia beneath it, is mentioned as a possible cause. Other writers have blamed the richness of the veins in this locality and the fact that they have no valves; though how valves could hinder the spread of infected blood *toward* the center of the body, it is not easy to imagine. Another suggested cause is the absence of lymph glands in this vicinity. One should also keep in mind the numerous pre-formed serous spaces in the bones of the face and skull; and their accessibility to an extending inflammation; for the usual spread of infection is first by the lymph channels, and later, possibly, by the blood.

Whatever the pathology may be we must accept the fact that a patient with a facial infection is in some danger of deeper, and possibly fatal, infection. This risk, expressed in percentage of deaths to all cases of facial infection, must be a very small one; far smaller than a surgeon operating chiefly upon ward patients would be likely to realize; but none the less it is a real risk, and should be reckoned with. It is therefore important to consider what bearing this risk has on the treatment of a patient with a *commencing* purulent infection of the face.

By limiting the consideration to *commencing* infections we shall keep well within the limits of minor surgery. This also permits one to observe accurately the type of infection, and its method of spreading or disappearing, while the patient is essentially normal, and not overwhelmed by the poisons of an extensive or deep-seated process; nor by any of the complications which may follow prolonged infection. Moreover the effect of local treatment can best be judged, while the infection is in its early stage, and still well localized.

For practical purposes these commencing infections may be divided into three groups according to the depth of penetration of the infective agent. In the most superficial type, the pus when formed lies just under the epithelium. It may dry up or be expelled, with or without treatment, the lesion never having become anything more than a very small pimple; or it may extend into the deeper skin or below it.

The second group is made up of small boils and some mild carbuncles, situated in the true skin, which either spontan-

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eously or because of favorable treatment discharge their pus and necrotic tissue, if any, externally, before the inflammation has been able to extend materially beneath the skin.

In the third group such extension takes place, but only in tissues in immediate contact with the primary lesion. If the infection has spread to the deeper parts, and has produced thrombosis or abscesses in the sinuses or elsewhere it is no longer in the early stage to which this paper is limited.

The conclusions of the writers of some of the articles referred to were so at variance with my own experience that I decided to make notes of the facial infections that I was called upon to treat. It so happened that the next 6 patients in this category illustrated the three different depths of infection mentioned above. They were in brief as follows:

Case I. B. R., male, aged thirty-three years. Four days previous to examination was shaved in a "dirty shop." Two days previous to examination noticed a pimple of the lower lip which he did not squeeze. One day previous to examination the lower lip began to swell and the swelling increased rapidly.

At examination: A pus scab ¼ in. in diameter just under the epithelium of the lower lip, to the left of the median line. Marked edema of the lower lip, especially of the left two-thirds. No *bard* swelling; little pain; temperature 98.4° F.

Treatment: Scab picked off; ulcer swabbed with a chlorine solution and a simple ointment applied. Patient to apply moist heat every fourth hour.

Twelve hours later swelling two-thirds gone.

One day after treatment swelling entirely gone; ulcer shallow.

Case II. H. F., female, aged nineteen years. A four days' pimple of the upper lip; not squeezed. One day before examination a "yellow head" was picked off and hot water applied.

At examination: Small opening in skin filled with a friable slough and a minute drop of pus; induration ⅜ in. in diameter.

Treatment: Slough picked out with slender forceps; dry dressing.

One day later; induration ⅛ in. in diameter; dry scab. This removed for examination of wound; no pus under it.

Case III. M. M., female, aged sixty-four years. Five days previously a pimple of the right cheek, just above lip, was picked and squeezed. No subsequent discharge.

At examination: Small mark in skin; no pus showing; induration ½ in. in diameter.

Treatment: Injection of 1/20 grain of cocaine; incision, ⅛ in. in diameter, made crucial beneath the skin. Small amount of pus escaped; dry dressing. Hot water to be applied t. i. d. by patient.

One day later; induration ⅜ in. in diameter and softer; slight discharge.

Two days after operation induration less; redness less; discharge less.

Six days after operation induration gone; redness gone; small dry scab.

Case IV. J. V., male, aged twenty-four years. Two days' infection of right cheek near nose.

At examination: Small pustule midway between right nostril and pupil of right eye; deep induration ⅓ in. in diameter; edema from edge of eyelid to lower part of nose.

Treatment: Minute cocaine injection; deep puncture with narrow-bladed knife; small amount of pus and serum escaped.

Two days later; swelling gone; dry scab in wound; this removed for examination; no pus under it.

Case V. W. T., male, aged twenty-seven years. Two days' small hard boil on right cheek; pricked and squeezed by patient.

At examination: Deep conical induration, ¾ in. in diameter, surmounted by a blister.

Treatment: Blister clipped off; small cocaine injection; small deep incision ⅜ in. long; a few drops of pus escaped. Daily dressing.

After three days induration nearly gone; a small slough of skin, exactly bisected by the incision, now loosening. The infection showed no tendency to spread after the incision.

Case VI. H. K., male, aged sixty years. Seven days' small carbuncle behind left ear but not in the hairy scalp. Slight discharge through two small openings; no manipulation by patient.

At examination: Raised reddened area, ¾ × 1 in.; several visible points of suppuration, two of which are discharging. Edge of

infected area sharply limited; no surrounding cellulitis.

Treatment: 4 pus pockets opened by very small crucial incisions. Dressed with simple ointment on dry gauze.

Two days later part of slough picked out.

Four days after operation remainder of slough loose and picked out. Only a small loss of skin; same dressing.

Five days after operation no more pus or slough; opening in skin ⅛ in. in diameter.

Ten days after operation wound entirely healed.

What conclusions may fairly be drawn from these cases? In the first place let it be freely admitted that the spread of an infection depends not only on its situation and extent, but also on the nature of the infective organism, and on the resistant power or the patient. Probably the infection in all these cases was of a mild type; and all the patients were apparently healthy, so that their resistance was probably high. Moreover it is quite likely that the patients would have recovered if other types of treatment had been employed; or without any treatment whatever. In Case II recovery, as far as the spread of the infection is concerned, had already taken place, so that no active treatment was given. In Cases IV and V, if one had waited for a spontaneous cure of the infection to take place, it seems likely that there would have been a considerable further spread of the infection during the delay so that an inward extension with serious or even fatal result might have taken place.

The real test of treatment in such cases is not simply that the patient recovers, or the reverse; it is that the recovery begins immediately after treatment is administered, and that the healing is prompt, and with a minimum of scar.

The object of the incision is to permit the escape of pus and necrotic material. A small incision correctly placed will do this. It must pass through or at least reach the center of infection. When it does this it relieves the abnormal pressure of which the induration is evidence, and thus permits the blood to circulate normally through the tissues, destroying the infective agent and counteracting its injury. Until the physical signs indicate where the center of infection is located, an incision is of doubtful value. If it simply divides edematous tissue, it can have little effect upon the progress of the infection. This is illustrated by a case mentioned by Walton Martin.* The patient's whole face was swollen and he was desperately ill. Three long incisions were made in the cheeks and upper lip, but without reaching the center of infection, which autopsy showed to have been in the cavernous sinus. The failure of an incision which does not reach the center of infection is hardly an argument against an incision which does reach it, and thus relieves the patient.

What is to be said of the numerous other methods of treatment which have been employed in these cases of facial infection, all of which have their staunch advocates?

Heat, in whatever form it is applied, increases the blood circulation of the infected area, and may thus check the infected process, if it is not too severe. This power is clearly a limited one.

External antiseptics may destroy bacteria which are near the surface. Many a pimple has been aborted by pure carbolic acid, introduced into it on the point of a toothpick. Such measures cannot be expected to control infection which has passed beneath the skin.

The bactericidal power of the roentgen ray is also very limited.

If an antitoxin should be developed which would act as promptly and efficiently as the diphtheria antitoxin, it would be the ideal treatment; for it would be effectual wherever the infection was placed and it would leave no scar. The vaccines now available have some power in preventing recurrent attacks of boils, but

* Martin, W. The fatal outcome of certain cases of staphylococcus infections of the face and lips. *Ann. Surg.*, 76: 13, 1922.

they are not sufficiently powerful to stop an acute infection once it has started. So we still have to rely on surgery in acute cases; but the possible aid of vaccine therapy in conjunction with it should be borne in mind.

Manipulation in any form is generally condemned. Squeezing may cause the contents of a pimple to squirt out on the surface, and thus provide efficient drainage. It may also press the pus inward instead of outward, and thus rapidly spread the infection. If the pressure is severe it bruises the tissues and thus provides a fine field for the growth of the infecting organisms. Even when a boil has been lanced anything more than the gentlest pressure to hasten the exit of pus is unwise; and even this is unnecessary.

Suction has been employed to bring the pus or necrotic material to the surface. It is incapable of producing the harm which may be caused by squeezing; but to be effective there must be an opening, either spontaneous or the result of incision; and if there is a free opening, the suction is not indispensable.

Turning now to operative measures, we find that the merits of a large incision have been extolled by some surgeons who have vigorously condemned a small incision. If the incision is correctly placed, and is large enough to provide an easy exit for the pus and necrotic material, it has all the advantages of a still larger incision, and it heals more promptly and leaves a smaller scar. It is true that a small incision requires careful watching lest it stick together or dry at the surface, while drainage is still required. This accident can be prevented by hot wet applications, or by the use of wet dressings, or by dressing the wound with an ointment. The incision should not be *too small;* but to extend it beyond the area of dense induration, into the adjacent tissue which is merely edematous, has no value. The proper length of incision was clearly shown in Case v. The ⅜-in. incision bisected the induration. It was later shown to have bisected the center of infection exactly; for the tissue which was damaged beyond repair by the inflammation later appeared as a small slough on each side of the cut surface. This slough was not due to the incision, however, for it occupied only the central third of each cut surface.

Next in order of severity may be mentioned crucial and multiple incisions. These find their place, if at all, in more extensive lesions than the commencing suppurations considered here. Their chief advantage is the freer drainage they give, or the opening of more than one center of infection, should such exist. These ends can be gained, at least in many cases, by undercutting the skin along the edges of a single incision. This will open additional pus pockets, and if the under cutting is not too near the surface of the skin, and is not carried too far from its free edge, no necrosis of the skin will be produced. The scar will then be simply that of a linear incision.

A more radical measure is excision. H. Heinlein* says: "In dangerous furuncles of lip, cheek, etc. . . . we must excise, never incise." He says his elliptical excision should give 100 per cent recovery, and adds, rather naively, that the scars from the granulation process are "large but relatively smooth, and not very disfiguring."

Undoubtedly an excision will give very free drainage; but why sacrifice tissue in no way responsible for the infection, and which if properly handled will not interfere with the body's efforts to overcome the infection?

Another and more serious operative treatment, advocated by several writers, is the ligation of the angular vein, or the facial vein; or even the internal jugular vein. The history of surgery tells us of numerous peculiar operations which have been popular for a time, and then have been abandoned. One is inclined to look leniently upon them as belonging to the age of superstition, or at least to an age previous to the clear understanding of correct surgical principles. But what can

**Muncb. Med. Wcbnscbr.* Oct. 5, 1928.

be more peculiar than the ligation of a single vein to control infection? Apparently the reasoning runs as follows: Patients with a fatal facial infection sometimes die with suppurative thrombosis of the cavernous sinus. The angular facial veins are connected with the cavernous sinus. Therefore ligation of them will prevent suppurative thrombosis of the cavernous sinus.

Consider this hasty conclusion in the light of the following: Surgical pathology teaches that infection spreads chiefly by the lymph spaces and lymphatics, and only slightly by the veins. Ligation of a vein predisposes to thrombosis *proximal* to the point of ligation as is seen in numerous cases of ligation of dilated veins of the leg. Anatomically the facial vein has so many branches that freely anastomose with each other and with other veins, that ligation of one or two trunks must have only a very slight effect upon venous circulation. It seems incredible that anyone who has ever seen a wax-erosion preparation of the veins could think of affecting the flow of blood by ligation of a single vein.

All things considered, the conclusion seems warranted that infections of the face present no peculiarities which set them apart in their treatment from infections of other parts of the body; and that prompt correct incision of a focus of infection offers the best chance to check the infection locally; to limit its tendency to spread, and thus to favor a prompt cure of the patient. If one wishes a motto for his guidance in these cases, let him disregard one that has recently been offered, *Noli me tangere* and choose rather one with centuries of success to its credit, *Ubi pus, ibi evacua.*

THE OPERATIVE TREATMENT OF HALLUX RIGIDUS*

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THERE is no minor operation more likely to bring discredit to the surgeon than the attempt to cure a stiff great toe. I speak with experience as, for some years after the War, I did a considerable amount of Medical Board work for the Ministry of Pensions and examined a large number of patients who were supposed to have been cured of this condition. The results were thoroughly unsatisfactory and most of the patients had to be granted a continued pension. The technique of the operation is therefore a matter deserving some consideration.

In the unsuccessful cases referred to above the operation had consisted in the partial removal of the metatarsal head. The operators were evidently influenced by Sir Robert Jones' dictum that it is essential to leave the lower part of the head so as not to remove an important weight-bearing point of the foot. The after treatment had been carried out with that leisurely thoroughness so characteristic of state-paid hospitals; so that the unsatisfactory results can only be attributed to the operation itself. I have also had bad results myself from this operation, even when combining it with transplantation of the bursa as advised by C. H. Mayo; but I ascribed this to some possible error in technique. I now regard it as a thoroughly bad operation and I believe that the fear of removing too much bone is a fetish.

Hallux rigidus, when at a stage requiring operative cure, falls into two classes: (1) when the limitation is only in the movement of dorsiflexion; this should strictly be called "hallux non-extensus," and (2) when the joint is ankylosed either by fibrous periarthritis or by exostosis. The former type is very common and it is mainly this that I wish to discuss. There is a range of movement of about 45° of plantar flexion from the straight position but there is no dorsiflexion. The movement present is free and painless and the block occurs suddenly when the toe reaches the straight position. Examination of the articular surface in these cases shows an apparently normal cartilage and the limitation of movement is due to an overgrowth of bone (exostosis) along the superior articular margin. It would seem criminal to sacrifice the head of the bone in such a case but smaller excisions of bone have not been satisfactory. Mere removal of the exostosis is useless and an oblique section including some of the articular cartilage risks a recrudescence of arthritis and frequently gives rise to a greater overgrowth of bone than before. The treatment in these cases is as follows: the patient has about 45° of free painless movement in his joint but the movement is *in the wrong direction* to be useful to him. Any interference with this damaged joint is very likely to cause a recrudescence of arthritis and restrict movement still further. Therefore leave the joint severely alone and do a cuneiform osteotomy of the neck with the base of the wedge upwards. Keep well behind any exostoses; start with a small saw or chisel and complete it neatly with sharp bone forceps. Close the wedge-shaped gap by dorsiflexing the great toe as freely as possible and fix it in plaster for a month. If the dorsal exostoses are so big as to be causing a bunion they must be removed with the wedge but in this case it is difficult to avoid opening the

* Submitted for publication February 6, 1929.

joint. The patient may get about in a special plaster boot as soon as the wound is sound. In this way you swing round the range of movement dorsally without any interference with the arthritic joint, and enable the patient to dorsiflex his toe enough for comfortable walking. It is very remarkable how little extra dorsiflexion is needed to make the patient comfortable. I generally dorsiflex the toe 45° (actual angle 135)° in plaster but the ultimate range of movement is generally much less than this, though the patient has no doubt about the relief given him. Browning was evidently thinking about this joint when he wrote: "Oh the little more and how much it is," for a few degrees of movement makes an enormous difference here and patients will complain of one side only when it needs very careful observation to detect the difference between the two. The only practical difficulty in this operation is to get the wedge cut from the bone to close up. There is a good deal of ligamentous resistance so one must use considerable force in dorsiflexing the toe and put on a strong plaster cast. The patient subsequently wears an ordinary boot which merely needs to be loose enough to avoid pressure on the joint.

In the second type of case when the joint is fixed or nearly fixed, this operation is of course useless. I have explained why I dislike partial resection of the metatarsal head; it results in a stiff toe again. Another operation sometimes practiced is resection of the proximal phalanx; this results in a flail toe which falls about in a manner ridiculous to behold and is entirely useless for progression. The operation which gives the best results is *complete* excision of the metatarsal head and it does not matter very much if the operator takes a generous view of the length of the neck! If this is done it matters not whether or no the bursa is transplanted but, as it is presumably an inflammatory tissue, I prefer to remove it if present. I like to fix the joint in plaster for ten days and let the patient commence walking in a cloth boot with a metatarsal bar in about a fortnight. The foot is not fit for really heavy work for about three months. One of my recent patients was a ward sister who had been compelled to give up her work owing to pain in the toe. The work of a hospital nurse is exceptionally hard on the feet; but in three months she was doing full duty again in complete comfort.

It remains to be mentioned that, if operation is contraindicated or refused, a clever bootmaker can generally make the patient comfortable by hollowing out a groove for the front of the great toe and fixing a thin metal plate in the inner side of the sole. This is so expensive however that the operation may be regarded as an economy.

CONTUSIONS AND ABRASIONS*

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NEW YORK

A TITLE such as this suggests the almost stereotyped diagnoses so commonly made during our ambulance surgeonship, a period which for many of us is now pre-pre-war.

Contusions bulk large in any statistical appraisal of the traumapathies, and of all the traumata they are doubtless the most common.

As to *site*, we recall that involvement of the scalp, the abdominal wall, the thigh. the calf and the joints attract attention most.

As to *gravity*, we appraise them as mild, moderate or severe.

As to *causation*, we recognize such factors as direct violence, and indirect violence, or both. A very common combination is contusion-sprain affecting a muscle group or a joint, when the accused trauma invokes a direct impact plus a twisting or wrenching violence. In this last group is that troublesome complex now so generally classified as "back injuries," or "low back strain," or "spinal contusion-sprain." Likewise, we revert to an almost equally puzzling group affecting such large joints as the shoulder, hip and knee.

Diagnosis rests upon the (1) history of injury, (direct, indirect, or both); (2) local pain, swelling, tenderness; dysfunction; (3) and later ecchymosis of variable extent. The *hematomata* are the circumscribed or encapsulated group so strikingly visualized in the scalp, along the margins of the iliac crest, and in the gluteal region.

There is a rare form, affecting chiefly the arm and less often the leg, to which the appropriate term "traumatic edema" is applicable. Here there is vaso-motor disturbance enough to suggest ischemia; indeed in the arm the syndrome of Volkmann's Ischemia is imitated, and in the lower extremity a pseudo endarteritis obliterans is apparently present. Recently the writer has had two such examples in the upper extremity, each the outcome of contusion-sprain. In one, there was violaceous swelling of the hand and forearm, surface coldness, and decided diminution of the radial pulse. This case resisted all forms of physiotherapy, suspension, traction, and splintage during a period of thirteen months. Realizing my impotency to benefit the patient further by these acceptable methods diligently practised by other surgeons, it was resolved to attempt arterial decortication, the Leriche operation. Accordingly the brachial artery was exposed in the upper arm and a cuff of the external coat was excised for a distance of about one inch. The outcome was dramatic and sudden in that next day the swelling, the color, the surface coldness and the pulse volume changed abruptly for the better. At this writing (12 weeks after operation) the extremity subjectively and objectively is practically normal and the patient has returned to work. The rationale of this "sympathectomy" procedure is in dispute, but in selected cases it apparently has merit enough to warrant trial in that group in which other accredited measures prove valueless. Less often has it proven successful in the lower extremity when practised by me for pathological processes already initiated in the blood vessels, as in various types of endarteritis with or without evident or impending gangrene.

IMMEDIATE TREATMENT OF CONTUSIONS

(1) Hot applications of tap water, saline solution, witch hazel or diluted alcohol.

(2) Plentiful dressings soaked in any one of the above.

* Submitted for publication January 31, 1929.

(3) Firm bandaging.
(4) Elevation and moderate usage.

INTERMEDIATE TREATMENT OF CONTUSIONS

(1) Application of hot compresses of soap suds.
(2) Massage with camphorated oil.
(3) Exposure to the rays of a 60–100 watt electric light.

Each of the above to be used 10 minutes two or more times daily.

This treatment is used so often that it is known on my records as SOL; S for soap, O for oil, and L for light.

Use of the part is insisted upon so that by self-massage, circulatory and muscular activity may be preserved.

LATE TREATMENT OF CONTUSIONS

Here we encounter such end results as pain, weakness, atrophy, dysfunction and perhaps the deformity of fibrositis or ankylosis. There also is often the non-co-operation of the patient due to fear, depression or desire; hence the morale and the moral may require as much of our attention as the physical and the clinical.

At this stage physiotherapy is of great value, and such measures should be *carefully supervised, directed, regulated* and *prescribed* by the surgeon himself. Of these, massage, dry or moist heat, the whirlpool bath, muscle exercises, the rowing and weight machines all have a place. Diathermy in some cases appears desirable; but it is not in my experience by any means the vaunted cure-all of some enthusiasts. As a means for producing regulated rhythmic motions for stiff or contracted muscles or joints, the writer has recently perfected a motor-driven portable device capable of a sustained pull from zero to 150 pounds. This machine has a pull-and-let-go action (a systole and diastole) which allows gradual stretching or elongation of the involved elastic muscle, tendon, fascia or capsule. It can be used for any set of muscles and for any joint. As a means of reducing dislocations or fractures it is quite effective, as it in reality motorizes fracture tables or traction devices.

In this respect it is comparable to the advance made on the hand saw by the motor saw.

However, of all forms of physiotherapy, return to work is the best measure not only from the physical but also from the psychical side. By this is not meant substitute work nor vocational therapy; these alternatives apparently are most applicable to the grossly handicapped.

Idleness is a bane to the injured, and light work preliminary to regular work is a blessing. There is no place in the day time home for the average workman, except on Sundays and holidays, and "to have to hang around the house" is a bad thing for the patient and not a good thing for the wife or family.

The stimulus of "being back on the job" is immeasurable and it is better to be a limping water carrier in the procession than to stand on the curb and feebly cheer as the parade of your own passes by.

The gross defects, such as contractures and anchylosis are obviously problems outside the scope of this brief survey.

For the *hematomata*, pressure ordinarily suffices. If aspiration or incision is attempted, it should be delayed for 24–72 hours and then performed with every attention to asepsis. To "suck out the blood" of a hematoma without due care is on a par with the probing-for-the-bullet type of surgery so common some years ago.

There is enough for the medical examiner to do now without adding our meddlesome efforts to his burdens.

In passing it is pertinent to say that many fractures of the skull are associated with hematoma of the scalp. X-ray or incision are the best means of differentiation, and even the most careful palpation and erudite explanation cannot supplant these diagnostic criteria.

ABRASIONS

The chief interest and importance in this class of injury is because they are so

numerous and are potential sources of infection.

Sites commonly involved are the hands and feet, the naso-labial region, the shin and the outer surface of the thigh.

Extent varies from an almost imperceptible scraping to a large surfaced "brush burn" so often seen on the thigh. On the hand and on the face (notably continguous to mucous membranes) small lesions may assume a gravity entirely disproportionate to their initial extent.

Symptoms are practically limited to slight bleeding, swelling, soreness and dysfunction. If infection appears, we have in addition variable cardinal signs of cellulitis, with or without systemic effects.

Treatment primarily aims to prevent infection, and with that in view the essential step is to sterilize and protect the affected area. This is best accomplished by gentle soap and water applications, reinforced if necessary by grease solvents such as gasolene, benzine or kerosene. Drying is the next step, and then iodine (full strength tincture) should be applied freely. If the area is small, a patch of flamed adhesive is an ample protective. If however, bleeding is free or the area is large, a layer or two of sterile gauze should be applied, and over this the adhesive is then fastened. In a finger or on a limb, the adhesive should be placed spirally so that circulation will not be impeded.

In the treatment of any wound (and abrasions *are* in the wound class) we should never forget that any wound not made with surgical intent is already infected and should be so regarded. Hence the basic problem in the treatment of every break in the integument is actually the treatment of potential or actual infection. Antiseptics in and of themselves are of no absolute value, and the experience of ages is to the effect that their potency is often over estimated by enthusiastic advocates. Each generation furnishes some "new and powerful antiseptic" which is supposed to have superlative merits. This "discovery" is tried for a time and then goes into the discard of numberless predecessors.

Among other things, an antiseptic is supposed to be a germ killer, a solvent of secretion, a fixative of tissues, an irrigating medium, a deodorant. Any chemical possessing these five elements would be valuable in the treatment of infected wounds, if at the same time it did not kill the tissue cells, if it had penetrating powers, if it did not coagulate albuminoid material, and if by absorption it did not damage the kidneys or other organs. During the War, it has been stated that over 200 different antiseptics were tried out in the greatest field and under the most adverse and diverse conditions ever afforded for the practice of traumatic surgery, and at the end of it all, the surgeons of greatest experience concluded that chemical sterilization was of doubtful value by comparison with mechanical sterilization (debridement).

Just now we are in the waning throes of another propoganda promising wound salvation if we would but employ a popular wound rouge, or else a colorless preparation once regarded as a sovereign remedy in certain kidney infections. Surely as a profession we are a gullible lot and apparently will not learn from our own previous experience or that of our forefathers!

Hence in the treatment of an abrasion or any other wound due to trauma, we must not rely on the cleansing or disinfecting power of any antiseptic. Plentiful use of soap and water is the best safeguard so that the field may be rendered as surgically clean as possible. If any antiseptic is used at all, let it be one that has proven harmless locally and systemically, and with this in view the oft tried tincture of iodine is advised.

Infected abrasions are problems in the management of cellulitis, or localized ulceration. The former usually responds to hot wet dressings of magnesium sulphate (saturated solution). No incision should be made until pus localizes, as indicated by local pain, fluctuation or induration.

Ulcers following abrasions usually respond to the open exposure method by which the area is exposed to the rays from the sun or from a 60 Watt electric light bulb. In the interval, the ulcerated area is covered by gauze soaked in equal parts of olive oil and camphorated oil. If the ulcer is large, a frame made of "Celoglas" (artificial glass) is an excellent protective. This provides a glorified vaccination shield made of thin meshed galvanized wire (like window screens) into the meshes of which an acetone preparation has been poured. This is light, translucent and transmits violet rays. Placed over a wound it makes a flexible tent or housing so that the dressings need not actually contact with the raw surface.

As in contusions, we must not forget the practice of using the part within the limits of producing pain, for self use means better circulation, new blood supply, less edema and more flooding of the part with natural protectives. Hence mobilization and not immobilization has a place in the treatment of these traumata just as it has a place in the treatment of bone and joint injuries.

THE TREATMENT OF INJURIES OF THE CHEST*

RALPH BOERNE BETTMAN, M.D., F.A.C.S.

CHICAGO

THE presence or absence of a pneumothorax following a chest injury is of such importance in the treatment of a case that any study of thoracic injuries must naturally be divided into two parts: cases with a pneumothorax and cases without a pneumothorax.

When the wound in the chest wall remains open so that there is a direct path from the pleural space to the exterior, the pneumothorax is called an open pneumothorax. The changes in the physiology of respiration in the presence of an open pneumothorax are profound. The lung on the side of the wound can collapse because air can be sucked into the chest cavity to take its place. The lung on the opposite side can also contract because the mediastinum is a very elastic membrane, and in the otherwise normal individual offers practically no resistance to the pull of the lung. If the wound into the pleural cavity is large enough, or if the patient makes no more inspiratory efforts, both lungs will finally collapse almost to the limit of their elasticity. However, one of the very first reactions to an external opening into the pleura is a forced inspiratory effort. The diaphram descends, the ribs are elevated and thus spread outwards, and a very rapid increase in the size of the intrathoracic cavity results. This increase in capacity causes a suction action. Where normally the trachea is the only inlet through which air can be sucked, in the case of an open pneumothorax the air can be sucked through the wound. Depending upon the relative sizes of the openings of the trachea and the wound, the relative amount of air gaining access to the lungs and to the pleural space will vary. However, even with a very large wound of the chest wall enough air will gain access to the lungs through the trachea as a rule, to maintain life provided the patient is at absolute rest and the lungs in otherwise good condition. The air entering in through the wound fills the pleural space on the injured side, and allows the mediastinum to be sucked to the contralateral side. The forced expiration following will reverse the conditions. Air will be forcefully ejected from the sound lung through its bronchus. Most of the air will be forced out through the trachea; some of the expired air may be forced into the lung on the injured side. The mediastinum will be forcefully pushed over to the injured side. Much of the air in the pleural cavity on the injured side will be expressed through the wound. Thus there will be a sucking sound heard at the wound during inspiration, as air is drawn into the pleural cavity and a hissing sound during expiration as air is forced out of the pleural cavity.

Summing up the effects of the open pneumothorax we find: first, a collapse of the lungs with a marked diminution in the amount of air gaining access to the alveoli of the lungs; second, violent inspiratory and expiratory efforts on the part of the patient; third, a further reduction of available air because of the interchange of air from the so-called sound lung to the lung on the injured side; and fourth, a violent swinging back and forth of the mediastinum.

The patient is usually a pitiable sight, cyanotic because of lack of oxygen, making tremendous respiratory efforts to overcome the diminution of absorption area in the lung, and frequently in shock because of

* Read before the Society of Industrial Surgeons, Chicago, Jan. 7, 1929.

the sudden shifting of the mediastinum with its vital organs.

If the wound into the pleura can be

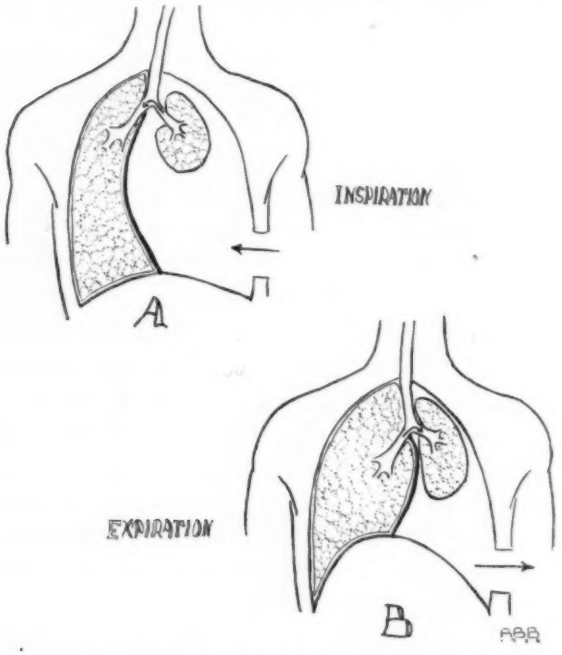

Fig. 1. Diagrammatic drawing. Mechanism of respiration in case of open pneumothorax. A. In inspiration homolateral lung has been able to collapse because air can be sucked in through opening. Contralateral lung collapsing almost to the same degree because the mediastinum can be sucked over. B. At the end of forced expiration, compression on contralateral lung by chest wall and diaphragm forces air out of bronchi, pushes over mediastinum. Reduction of size of chest forces air out through opening. Some air is forced from contralateral lung into homolateral lung. Diagram shows reason for sucking sound at wound, for diminution in aerating surface of lung, for violent mediastinal swinging and also mechanism of so-called "pendel luft."

closed by pulling the skin margins together, or by means of a wet towel, or even by means of the palm of the hand, the entire picture may change within a few seconds in a most startling manner. The easiest and most readily available material at hand to close the chest wound is the margin of the wound itself. If one margin of the wound can be pulled over the other, the following changes occur: The next inspiratory effort causes suction as before. Now, however, no air, or but very little air, can be pulled in through the chest wound but all or most of the air comes in through the trachea. Thus the lungs themselves will receive as much air as is required to fill the increase in the intrathoracic cavity, brought about by the violent inspiratory effort. The next expiratory movement forces air not only out of the lung through the trachea, but also out of the pleural cavity because if lightly held together the upper margin of the wound will act as a valve flap which is lifted as air is pushed out and shut as air is sucked in. The lung on the injured side and also the contralateral lung will be expanded still more during the next inspiration, and during the next expiration still more of the air in the pleura will be forced out. Thus after but a few respiratory cycles the pneumothorax may be almost entirely overcome, and the lungs practically completely expanded. As soon as sufficient aeration occurs the cyanosis disappears. With the disappearance of the carbon dioxide stimulation, respiration becomes easier and more normal, and with the obliteration of the mediastinal flutter the patient frequently recovers from shock. In a few moments the picture presented by the wounded individual has changed from that of a person apparently or actually gasping his last, to one whose appearance is no worse than if the trauma had been received in some other part of the body.

Our first cardinal rule in the treatment of injuries to the chest wall is: immediately close any sucking wound in the chest.

In many cases the wound of the chest naturally falls together as soon as the trauma which has caused the wound is over. This may apply to such wounds as gunshot wounds of the chest, stab wounds, or perforations of the chest in which the perforating object itself plugs the opening or in which the wound margins fall together when the perforating object is removed. Some air may have gained access to the pleural cavity during the trauma. This is now imprisoned and a so-called closed pneumothorax has occurred. At times crushing injuries to the chest may injure the lungs without actually breaking the continuity of the external thoracic wall.

In such cases, such as with a broken rib, air will often have escaped from the torn lung and result in a pneumothorax. The difference in physiology between a closed and an open pneumothorax is very great.

The lung on the injured side will be partially collapsed, the mediastinum will be sucked over and the lung on the opposite side also collapsed. However, the next inspiratory effort will enlarge the intrathoracic cavity, which as before will result in a sucking in of air to fill the newly made space. In the case of a closed pneumothorax, however, none of the air will be pulled into the pleural space, but all of it will come into the lungs from the trachea. The expiratory effort will force the air out of the lungs through the trachea in the same way that a forced expiration, such as a sneeze, forces the air out of normal lungs. There is apt to be some mediastinal flutter brought about as follows: During the forced expiration the captured air in the pleural space of the injured side becomes compressed by the pulling inwards of the chest walls and forces the mediastinum over towards the sound side, the next inspiration will overcome this compression and allow the mediastinum to return to its former position only to be pushed over by the subsequent expiration. This mediastinal flutter is exactly opposite in its swing to that produced in an open pneumothorax, is much less marked and produces much less shock.

The amount of dyspnea produced by a closed pneumothorax depends chiefly on how much air has entered the pleural cavity and as a result, how much the lungs have collapsed. This can be expressed technically by saying that the amount of dyspnea varies with the diminution in the vital capacity. By inserting a needle into pleural cavity and aspirating air the size of the closed pneumothorax can be reduced.

Thus another rule in treatment can be laid down. In the case of a closed pneumothorax, if the injured patient is in extreme dyspnea because of marked reduction in his vital capacity, air can be aspirated from the pleural cavity, expanding the lungs and increasing his available aerating surface. This should be done only if absolutely necessary because expanding the injured lung may result in an increase in bleeding and in the development of still another type of pneumothorax.

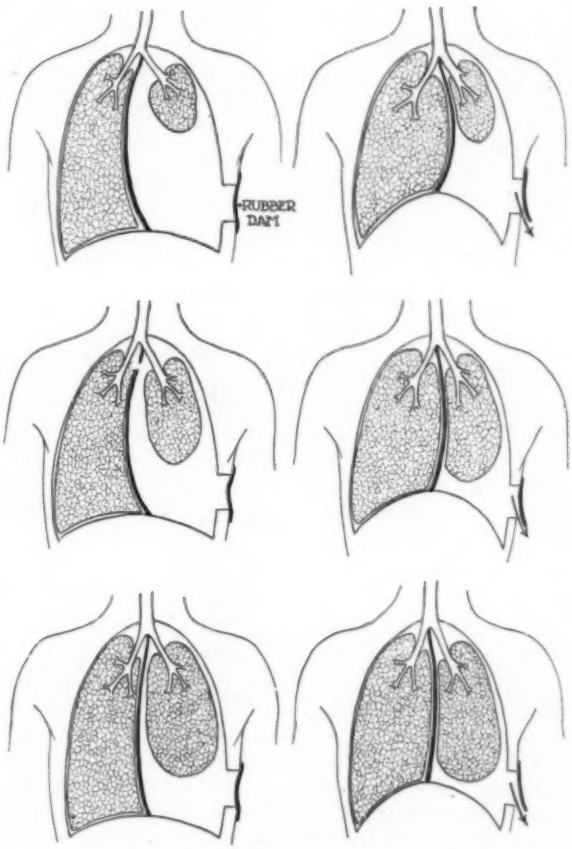

Fig. 2. Mechanism of treating open pneumothorax. Inspiratory efforts pull rubber dam firmly to chest wall. Expiratory efforts allow air to escape from chest wall. After the completion of a comparatively few respiratory cycles pneumothorax has been practically overcome.

Sometimes a crushing or perforating injury to the lung causes what we might term an internal open pneumothorax. In this case the wound in the lung gapes as the lung is expanded during inspiration and air is drawn into the pleural cavity. With the next expiratory effort the pressure on the lung closes the lung wound, and the pleural air can not escape. The following inspiration reopens the wound and draws still more air into the pleural cavity

allowing the lungs still further to collapse and at expiration again no air is forced out. More and more air is thus gathered in

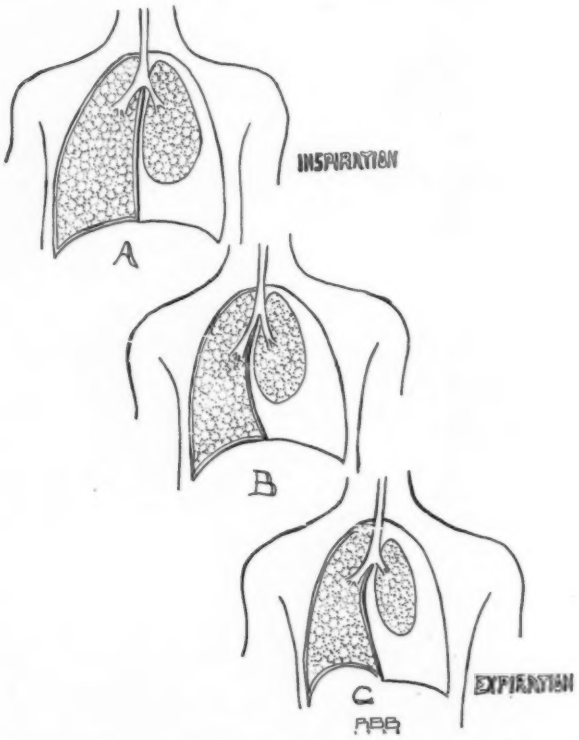

Fig. 3. Diagrammatic reproduction of mechanism of closed pneumothorax. A. Chest in middle of cycle showing collapse of homolateral lung, contralateral lung with shifting of mediastinum. B. At end of deep inspiration both lungs have increased in size equivalent to the increase of intrathoracic cavity. C. Expiration. Compression of lung fields has allowed both lungs to collapse. Imprisoned pleural air causes compression of contralateral lung and shifting of mediastinum towards contralateral lung.

the pleura on the side of the injured lung. The injured lung is collapsed more and more, the mediastinum can be sucked more and more to the opposite side allowing collapse of the opposite lung. There is less and less available air space. The anoxemia increases with the increase of the carbon dioxide tension. Deeper and deeper inspiratory efforts are made with the result that the pneumothorax is still further increased. Eventually the intrapleural pressure is actually positive except for a short period at the very height of inspiration. When this happens both lungs will be almost fully collapsed even at the end of inspiration and the patient will die of suffocation.

The treatment is obvious. The air sucked into the pleural space during inspiration must be allowed to escape during expiration. This can be accomplished by making an opening in the chest wall as follows:

If the case is first seen in the hospital, the thoracotomy can be carefully performed, a large-sized rubber tube can be inserted into the pleural cavity and the external opening of the drainage tube closed by a water valve made by attaching the drainage tube to a long tube which is dropped into a jar filled with water. In this way air will be forced out of the chest during expiration but during inspiration fluid will be sucked up into the tubing. If the water level is several feet below the lung wound a negative pressure many times that produced by a deep inspiration is necessary to suck the water up to the chest cavity. However, to avoid any danger from such a contingency, the jar used is sterile and a mildly antiseptic solution is used instead of water. If no tubing is at hand it is still possible to overcome the internal pressure pneumothorax by making a stab wound in the chest and then forming a flap, by pulling one wound margin over the other, as described under treatment of open pneumothorax. After the first shock has been overcome the chest cavity should be opened and explored and the lung wound sutured.

A third rule in the treatment of thoracic cases can be formulated as follows:

In the presence of marked dyspnea associated with violent respiratory efforts ascertain the intrapleural pressure either by means of a manometer or by inserting a hollow needle into the chest wall and seeing whether air is sucked in or forced out. If an actual or relative positive pressure internal pneumothorax exists allow for the escape of the pleural air.

Hemorrhage is another cause of death from injuries to the thorax. The most usual source of hemorrhage which can be controlled is from the intercostal vessels. This applies particularly to perforating wounds

and to injuries which have caused fractured ribs. Whenever there is an open wound with signs of hemorrhage, bleeding from the intercostal vessels must be suspected. The intercostal vessels, are fairly inaccessible, but can be easily compressed by passing a ligature completely around the rib. Thus one might almost be permitted to lay down another rule, to wit: If bleeding is severe after a wound of the chest wall, the intercostal vessels above and below the wound should be controlled by passing ligatures around the ribs both posteriorly and anteriorly to the wound.

When the symptoms from bleeding are not marked, and apparently no other intrathoracic lesion has occurred, it maybe advisable to practice watchful waiting. Frequently after a certain time no more bleeding will occur into the pleural cavity. In this case, the question arises whether or not to aspirate the blood. In my opinion, where this can be done with an exacting aseptic technique, it is preferable to remove the blood than to let it absorb. No attempt, however, should be made to do this within the first forty-eight hours, lest, as a result of the procedure, the hemorrhage recurs.

In case of large hemorrhages blood transfusion should be done.

If the bleeding comes from an injury to one of the large intrathoracic vessels, little or nothing can be done. The hemorrhage is usually so severe that death occurs before steps can be taken to control the bleeding.

If the lung is lacerated enough either to produce severe pneumothorax or cause severe bleeding from the lung tissue itself, the lung wound should be sutured. The lung tissue is exceedingly friable and therefore it is difficult or impossible to suture it in the usual way. By taking two strips of fascia lata, or strips of intercostal muscle and fascia, and laying these strips on either side of the lung wound, it is possible to close the wound by having the sutures go through the tough strips. This method is easy to carry out and is successful. If the laceration of the lung is confined to part of one lobe, it sometimes will be easier to remove the injured portion of the lung.

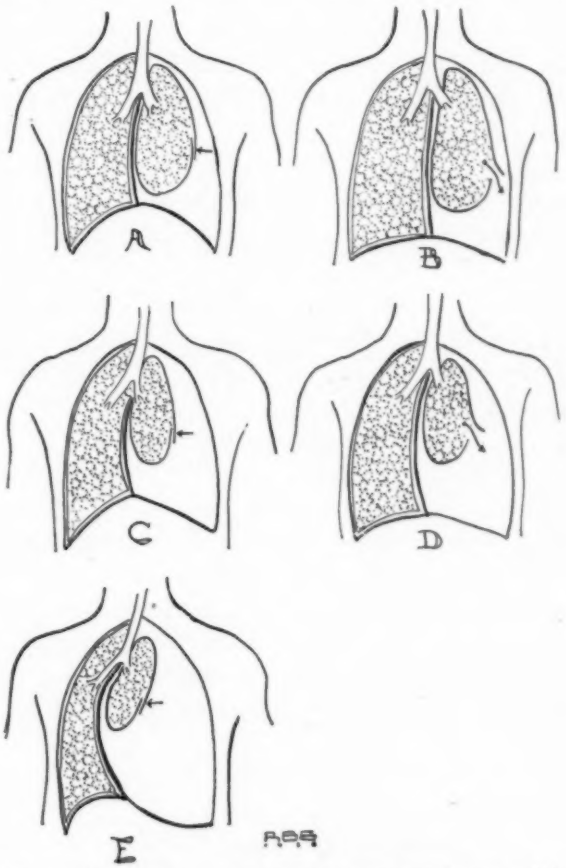

Fig. 4. Mechanism of internal pneumothorax with valve action due to lung wound. A. Pneumothorax lung wound closed. B. End of deep inspiration shows lung wound open by increase negative pressure with increase in amount of air in pleural space. C. End of inspiration, lung wound is closed. Pleural air cannot escape. Shifting of mediastinum; collapse of contralateral lung. D. End of next inspiration. Lung wound reopened, still more air permitted in pleural space. E. End of inspiration. Lung wound closed. More pleural air imprisoned with greater shifting of mediastinum and collapse of contralateral lung.

Operations within the thoracic cavity have lost most of their danger since the perfection of the gas anesthetic machines.

The pressure at which the gas is delivered can be increased by opening the valves farther than usual, and by making digital pressure over the outlet valve on the mask. If now the mask is held very tightly to the patient's face, especially if the face has

previously been well vaselined, enough pressure can be obtained fully to expand the lungs even if the pleural cavity has been opened through a long intercostal incision and held apart by rib spreaders. In this manner the surgeon can operate at leisure without fear of the open pneumothorax produced.

The thoracic cavity can be explored as easily, if not more easily, than the abdominal cavity, and there is no more reason why injuries to the lungs should not be repaired than injuries to the intestines. It is as illogical to rely on coagulants, drop in blood pressure, gravity, etc., to control intrathoracic bleeding as it would be to control intra-abdominal bleeding.

Another fundamental in the treatment of thoracic injuries is that unless there is reasonable assurance that the results of the trauma are such that they will take care of themselves without other interference, trauma to the chest should be given the same benefit of exploration as is now wisely accorded to trauma to the abdomen.

CONCLUSIONS

In injuries of the chest:

1. Immediately close all sucking wounds.
2. In the case of a closed pneumothorax which has been carefully diagnosed, if the injured person is markedly dyspneic aspirate air from the pleural space.
3. In the presence of marked dyspnea following a chest injury, ascertain the intrapleural pressure by means of a manometer, and by inserting a hollow needle into the chest wall and seeing whether air is sucked in or forced out. If a positive pressure internal pneumothorax exists allow for the escape of the pleural air.
4. Hemorrhage in chest injuries is frequently from the intercostal arteries running under the broken ribs. These arteries are best controlled by encircling the entire rib with a heavy suture.
5. Large lacerations to the lungs should be repaired.
6. The thoracic cavity is as easily explored as the abdominal cavity.
7. Unless there is reasonable assurance that the results of a trauma to the chest are such that they will take care of themselves without interference, trauma to the chest should be given the same benefit of early exploration as is now wisely accorded to trauma to the abdomen.

CIRCUMCISION*

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NEW YORK

WHILE circumcision has been employed as a religious rite of sacrifice for centuries, in modern times this procedure has been utilized either as a prophylactic measure or as a therapeutic expedient. Circumcision, being one of the less technical surgical operations, may be performed rather simply on newborn infants; however, surgical details should be followed with precision. Without any induced anaesthesia and under proper aseptic conditions, using 1 per cent picric acid solution or 3½ per cent tincture of iodine for preparation of the skin, careful inspection of the external genitalia should be made for congenital phimosis or excessively redundant prepuce. This is important so that subpreputial adhesions may be severed by the introduction of a grooved director or probe between the glans penis and the foreskin. The prepuce is forcibly extended beyond the glans and with scissors or scalpel the redundant portion is excised in a circular manner. Care must be taken to avoid injury to the glans, as such injury might cause a permanently constricted meatus. If the remaining mucous surface extends too far beyond the coronal sulcus, an additional portion may be trimmed; As a rule the only bleeding point is near the frenum, and this should be clamped and ligated with No. 0 plain catgut. In common with the ritualistic procedures, some surgeons do not suture the severed edges, but assuredly it is better technique to place No. 0 catgut sutures in four different places about the coronal sulcus for better wound approximation. These stitches should be placed in the following manner: one at the frenum, one on the dorsum in the midline above and one on each lateral aspect. No dressing need be employed save a piece of sterile gauze over the penis for protection against the clothing. A dry sterile dusting powder or boric acid ointment should be spread about the genital region.

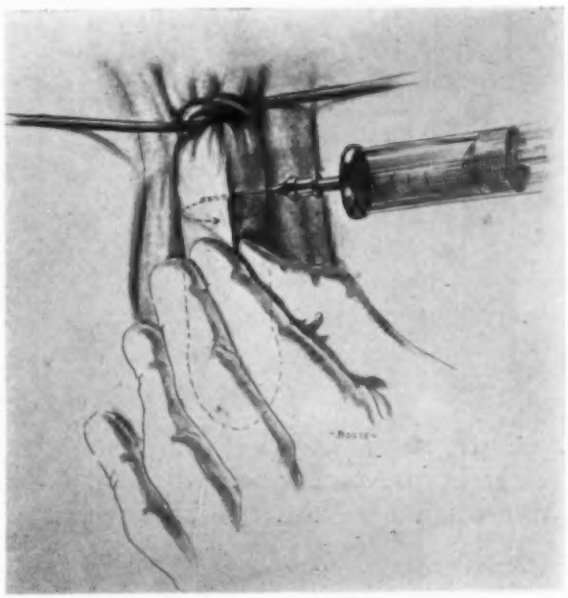

FIG. 1.

CIRCUMCISION IN ADULTS

In male adults circumcision is usually employed for redundant prepuce or for acquired phimosis due to a subpreputial pathological condition. The operation can well be performed under local infiltration anesthesia, using 1 per cent or 2 per cent novocaine solution. Under strictly aseptic precautions and with the skin prepared with 2 per cent picric acid solution, a rubber tourniquet is placed rather snugly about the shaft of the penis and a circular wheal of anesthetic is made 2 cm. proximal to the corona glandis. The needle should not be removed from the subcutaneous tissues during this entire procedure, as is well illustrated in Figure 1.[1] After the

[1] Original illustrations are the property of the Department of Urology, New York Post-Graduate Medical School and Hospital.

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wheal has formed (Fig. 2) a period of five minutes should elapse before the incisions are made. Two mosquito clamps are placed on the dorsum almost to the corona glandis, the blunt blade of the scissors being placed between the glans and the mucous surface

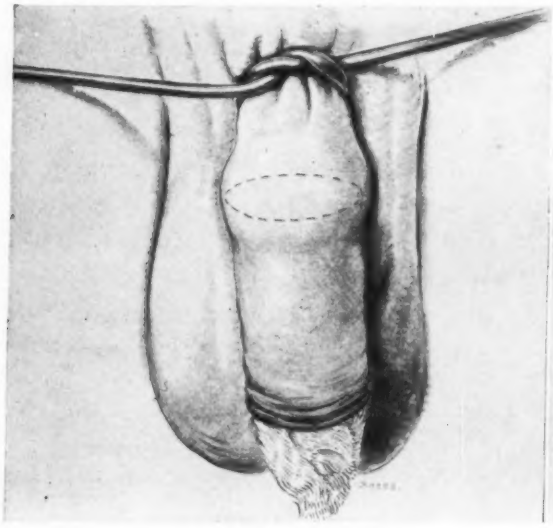

FIG. 2.

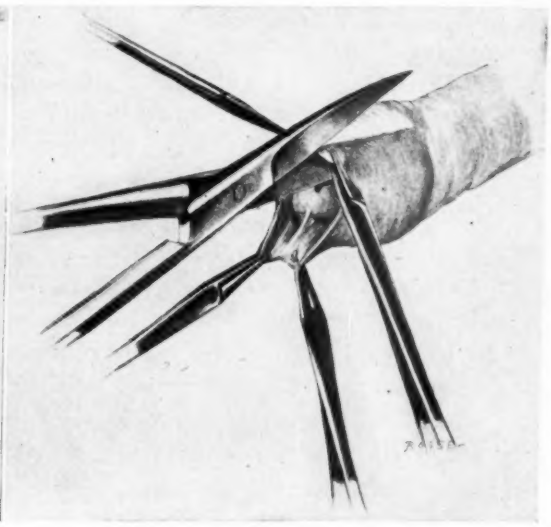

FIG. 3.

close together at the muco-cutaneous border of the prepuce on the dorsum in the median line, and two similar clamps of the prepuce. At the bottom of this incision a No. 1 plain catgut suture is tied, leaving the ends long for traction. A

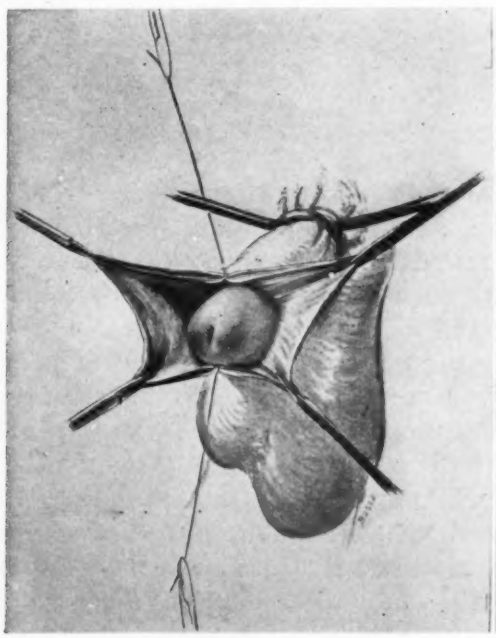

FIG. 4.

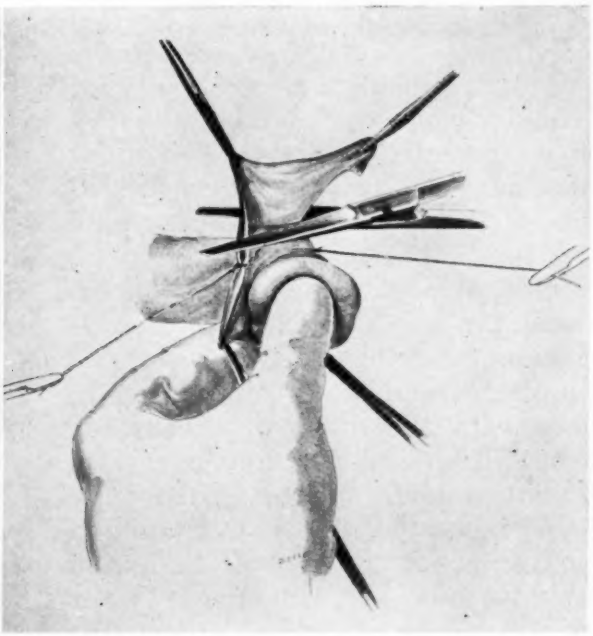

FIG. 5.

are placed to each side of the frenum below (Fig. 3).

Care is now taken to break up any sub-preputial adhesions. An incision with scissors is made between the two clamps similar incision and suture are made between the two clamps near the frenum (Fig. 4). The two flaps of prepuce are then resected close and parallel to the corona glandis. The tourniquet is then removed

and all bleeding points are carefully ligated (Fig. 5). Additional plain catgut sutures are placed laterally, four or six in number, depending upon the necessity for wound approximation (Fig. 6).

If the suture ends have not been cut short, a piece of vaseline gauze may be tied about the coronal sulcus. Otherwise dry sterile gauze is placed over the wound and a figure 8 adhesive plaster dressing is applied so that most of the glans penis is exposed (Fig. 7). This dressing will serve to prevent the premature loosening of the sutures.

Fig. 6.

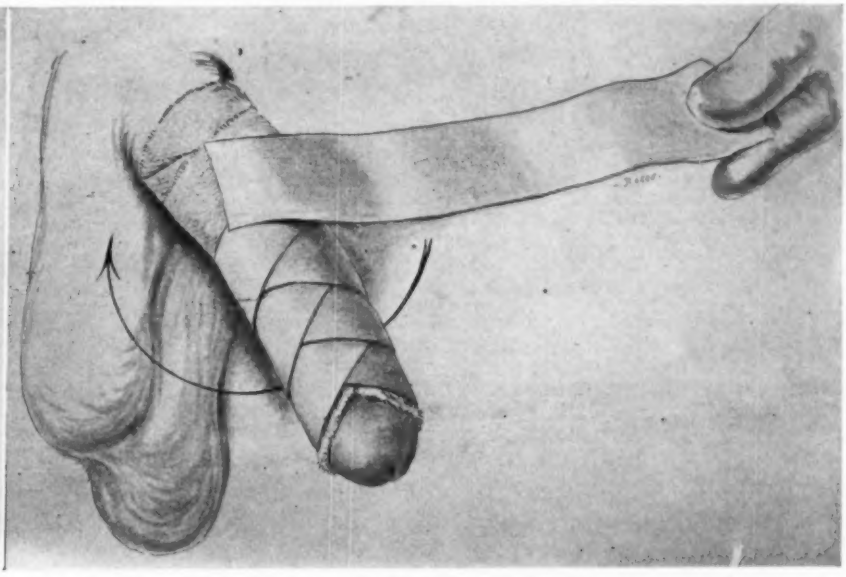

Fig. 7.

If a glandular or subpreputial chancre or chancroid be present with its consequent phimosis, dorsal or lateral slits only for better drainage should be made, care being taken to avoid incision of the lesion. Secondary circumcision in the aforesaid manner should be performed only when the lesions have been completely healed.

THE TREATMENT OF BOILS AND CARBUNCLES*

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NEW YORK

BOILS

WHILE general treatment is important in all cases of boils, in persistently recurrent ones it supersedes local measures. The general health should be improved and efforts should be made to increase the resistance of the individual to the infective microorganisms. Tonics, sulphur, yeast, light diet and catharsis, rest, sunshine and fresh air are generally recommended. In addition to these measures, staphylococcic vaccines or injections of colloidal manganese are valuable.

The local treatment varies in accordance with the location, stage of development and extent of the lesion. In general the value of radiotherapy in the treatment of acute and chronic pyogenic infections, especially furunculosis, has not been commonly recognized. While radiation should always be used as an adjunct to other forms of therapy, it has a striking value when properly applied. It is a painless method, aborting early lesions, with prompt relief of discomfort and without scarring. Roentgen and ultraviolet therapy have specific indications.

Incipient Lesions. When the lesions are incipient and acutely inflammatory, a suberythema exposure of filtered roentgen rays hastens the localization and in small lesions may be abortifacient. One roentgen-ray treatment usually suffices, rapidly relieving the pain and causing prompt involution. In the radiation of a furuncle the surrounding area is included as such exposure seems to prevent the development of neighboring lesions. On hairy parts the dosage should be one-half of an erythema dose, and on non-hairy parts it may be a little greater. I prefer filtration through 3 mm. of aluminum. The earlier an incipient lesion is treated, the more prompt is the involution and the greater the likelihood of a cure without suppuration. These benefits are of special advantage when parts of the face above the mouth are involved because such infections must be handled with caution on account of the danger of thrombophlebitis and meningitis.

Well-directed ultraviolet treatment will in many cases cause the disappearance of a furuncle if applied in the early stage. At this time blistering exposures given to a wide margin about the lesion yield excellent results. Carbon-arc or mercury-arc lamps produce benefits that often equal those from filtered roentgen radiation, one treatment being generally sufficient. The exposure produces an intense congestion and apparently stimulates the local defence, so that frequently one treatment causes complete involution. The local action on the lesion is directly bactericidal, and there is an increased blood supply to the part, with an augmentation of the lymphocytes and phagocytes. After the treatment a dressing of ichthyol ointment is applied. Other abortive methods of treatment such as carbolization and electrodesiccation have given relatively little satisfaction in my hands.

When the lesions are incipient and acutely inflamed, incision should be strictly avoided. Hot poultices should be applied every few hours and the part should be covered with a wet dressing of alcohol or liquor alumini subacetatis; ammoniated mercury ointment, or 10 per cent ichthyol in basilicon ointment (ceratum resinae, U.S.P.). These measures should be continued until the pain and redness have subsided and the process has become localized and inactive with frank pus.

* Submitted for publication February 14, 1929.

Localized Inactive Lesions. When the boil has become localized and inactive and shows definite fluctuation, free incision with drainage should be executed without delay. Following incision, healing is hastened by distance radiation with ultraviblet light, producing first-degree reactions. The treatments should be given every alternate day.

Recurrent or Chronic Type. In recurrent or chronic furunculosis confined to localized areas, fractional unfiltered or filtered roentgen rays often stop the development of further lesions and relieve conditions that have failed to respond to surgical measures. Filtered roentgen rays seem more efficacious than unfiltered for this purpose, but good results are accomplished by both methods. The dosage may be one-fourth of an erythema at weekly intervals, or three-fourths of an erythema at one sitting, without further exposures. An erythema should be studiously avoided although in stubborn cases an epilation is justifiable and beneficial.

On recurrent boils of the scalp, roentgen rays may be used with caution. Spectacular results sometimes have followed the administration of one fractional treatment. When the disease is recurrent on the back of the neck, no treatment equals filtered roentgen rays. Accurate arrangement of the patient and focussing are extremely important in this difficult location if the best result is to be expected. In recurrences of the disease on the scalp and the back of the neck, it is imperative to keep the scalp free of dandruff by local antiseptics. Ultraviolet radiation from a distance is useful for this purpose and simultaneously exerts a direct beneficial influence upon the furunculosis. In axillary cases, rest in bed with the arm away from the body is a measure of some importance. In treating the buttocks, the testicles should be screened by lead. Affections recurring on the vulva or perineum should be treated by fractional filtered roentgen rays in either the lithotomy or knee-chest position according to the best exposure. The parts should be kept scrupulously clean and free from the irritation of discharges, clothing or walking.

Generalized ultraviolet light baths for tonic effect should be given in all cases of recurrent boils. When lesions are widely disseminated on distant parts of the body, considerable reliance must be placed upon these treatments. Violent reactions or more than slight peeling should be avoided.

Ultraviolet light baths also give striking results in the treatment of multiple furunculosis in infancy. Usually this group of cases is treated surgically but in my hands better results have been attained by limiting incision to a minimum and by relying to a large extent upon actinotherapy and the use of local antiseptics, especially 3 per cent ammoniated mercury ointment.

CARBUNCLES

Carbuncles may be of the superficial or deep type.[1] The common superficial variety is characterized by pronounced cutaneous redness, multiple skin perforations in an early stage and, after sloughing, does not leave a very deep excavation. In the deep type, the lesion seems brawny and fixed like a malignant tumor; and there is late perforation and sloughing with deep crater formation.

Superficial Type. Roentgen therapy is almost a specific in lesions of the superficial type, causing prompt relief of pain, softening and evacuation of pus and rapid recovery. In lesions on the nose and the upper parts of the face[2] this method has special importance. Numerous authors have reported striking results from roentgen therapy of carbuncles. In general the indications, technique and dosage are the same as described for the incipient stages of furunculosis.

Carp[3] has compared the following four

[1] Philips, S. A dissertation upon carbuncles. *Lancet*, 1: 61–65, 1921.

[2] Roeder, C. A. Ligation of the angular vein in infections of the upper lip. *J. A. M. A.* 90: 272–273, 1928.

[3] Carp, L. Treatment of carbuncles. *Ann. Surg.*, 86: 702–706, 1927.

different methods of treating carbuncles: by roentgen ray, by surgery, by conservative therapy and by autogenous blood circuminjection. His work is based on a study of 153 patients with non-diabetic and diabetic carbuncles admitted to the Presbyterian Hospital, New York, in the past ten years.

The statements concerning dressings and the local and generalized exposures of ultraviolet radiation in the treatment of incipient furunculosis apply equally well to the superficial type of carbuncle. Both roentgen and ultraviolet therapy are usually dynamic in causing rapid regression, relief of pain and evacuation of the detritus.

Deep Type. In the deep type of carbuncle, radiation therapy is invariably of some benefit, preference being given to filtered roentgen rays. However, the results are not so good as in the superficial types, and one should beware against toying with radiation therapy when surgical procedures are definitely indicated by deep spreading or severe general intoxication, especially in patients who have low resistance. Extensive crucial incision going well beyond the inflamed margin, elevation of the flaps, and trimming away of necrotic material should be done under gas and oxygen anesthesia without delay, the cavity being packed with gauze soaked in Schlumsky's solution (phenol 30 per cent, camphor 60 per cent, alcohol 10 per cent). Healing is expedited by local and general actinotherapy.

The electric cautery, electrocoagulation and the electrothermic cutting current are recommended as superior to the scalpel by different advocates. Willmoth described electrocoagulation treatment which may be done under local anesthesia except in severe cases, which require ether. A full-strength hyoscine, morphine or cactine tablet two and one-half hours before operation, augmented by one-half strength tablet of the same drug thirty minutes preceding the operation, is effective. The indifferent electrode is covered with a towel wet with normal saline solution to make a good contact, and is firmly bandaged against the skin of the abdomen, the patient being in a prone position. Where no general anesthesia is used the active electrode is applied with a very light current which passes around the carbuncle in a circular manner for three to five minutes, during which time the spark is gradually increased. This causes the entire area to become numb. The current is then increased and the needle is pushed to the depth of the infected tissue, where it is allowed to remain. When the tissues become white, the needle is removed and inserted into an adjoining area to produce a similar effect. By repeating this procedure the entire pathologic condition is destroyed in a few minutes. The coagulated tissue is removed by a large curette or by the electrothermic cutting current, leaving a clean base to which a wet dressing of liquor alumini subacetatis, diluted 1:10, is applied. Bleeding points are controlled by plunging the active electrode directly into the vessel or by grasping the vessel with forceps and applying the active electrode to the forceps near the vessel. Pain is not experienced following the treatment because the small terminal nerve endings have been destroyed by the current. Healing may be expedited by the use of ultraviolet therapy, leaving a minimum amount of scarring.

SUMMARY

An incipient boil should be treated early by radiotherapy, which usually aborts the lesion with prompt relief of discomfort and expedites involution without suppuration and without scarring, or by ultraviolet light, one treatment often proving effective. A localized and inactive boil should be freely incised, followed by distance radiation with ultraviolet light to hasten healing. In recurrent and chronic types confined to localized areas, fractional unfiltered or filtered roentgen rays are recommended, with generalized ultraviolet light baths for tonic effects.

In the superficial type of carbuncle either roentgen or ultraviolet therapy causes prompt relief of pain, rapid regression and evacuation of pus. In the deep type, incision is generally the preferable method, supplemented by local and general actinotherapy.

LAME BACK*

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BOSTON

LAME back, which is of interest to all medical men, is probably one of the most common ailments of man. Ever since he began to assume the erect position he has been subject to this symptom. During the lapse of time there have been added to the erect posture the diseases of civilization and industry.

It is the purpose of this paper to discuss the more frequent causes of backache, their diagnosis and treatment. Much has been written and taught about backache, but many cases remain baffling and undiagnosed even after all the art and science at our command have been brought to bear on the individual case. Many patients suffer severely from slight causes and contrariwise many suffer slightly from lesions which one would suppose would produce the severest train of symptoms.

ANATOMY AND PHYSIOLOGY

A working knowledge of the structure and function of the spine is necessary in evaluating etiology, diagnosis and treatment. There are three physiological curves: (1) the cervical (anterior), (2) the dorsal or thoracic (posterior), and (3) the lumbar (anterior). Some include the sacrum as a fourth and posterior, but the sacrum properly belongs to the pelvis and is more concerned with pelvic than with spinal movements. Variations in these curves are seen in children where growth is taking place and they are seen also in various disturbances of posture and diseases which affect the spine directly or indirectly. The vertebral bodies articulate with each other, being separated by the intervertebral cartilages, and the processes articulate with each other by the pairs of superior and inferior articular processes. The vertebrae are held together and their movements checked by ligaments, the chief of which are the anterior and posterior longitudinal. The ligamenta flava connect the laminae of the adjacent vertebrae. The thick supraspinal ligament connects the tips of the spinous processes, the thin interspinal ligament connects the adjacent spinous process from root to tip and the intertransverse ligaments imperfectly connect the transverse processes. The articular processes are surrounded by capsules. The inclination of the pelvis varies with age, posture, and disease, from 44° to 60° in men and from 41° to 65° in women, the average normal inclination being about 50° to 60°.

The movements of the spine are (1) flexion, (2) extension and (3) lateral flexion-rotation. These movements are not actually great in extent, but are apparently so when associated with the free movements of the head, shoulders and pelvis. In general more motion takes place in the cervical and lumbar spines and less in the thoracic; movements in the latter are hampered by the thoracic cage. The movements are carried out and controlled by the free flow of power of the various groups of the muscles extending from the head to the pelvis. Any irritation of the deep structures causes spasm of the neighboring muscles with a resulting diminution of all the normal motions of the spine. In the spine the areas of greatest stress are found where the anterior and posterior curves are joined: first, the cervicodorsal junction, second, the dorsolumbar, and third, the sacral-lumbo; and any extra burden thrown on these areas produces more strain than the anterior and posterior ligaments can well sustain within the limits of their factors of safety.

In the pelvis the lumbosacral angle and

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the sacroiliac joints are, from their shape and position and the fact that the superincumbent weight of the body is almost wholly borne in this region, subject to much greater stress than the curves above. The iliolumbar and the sacral ligaments are not always sufficient to maintain their integrity against any increase in the angle of inclination of the pelvis, and so become thickened and sometimes calcify.

ETIOLOGY

A classification of the causes of backache should include:

1. Arthritis
2. Trauma
3. Bad attitude
4. Congenital anomalies
5. Malignant disease
6. Pelvis, abdominal and retroperitoneal disturbances
7. Unknown lesions (proliferative, infectious)

- 1. Arthritis (degenerative)
  - Disturbances of metabolism
  - Disturbances of posture
- 2. Trauma (industry)
  - Mild trauma, sprains etc.
  - Attitudes at work
  - Fractures, transverse processes, compression
  - Functional neuroses
- 3. Static or postural condition
  - So-called epiphysitis
  - Round shoulders, dorsal or dorsolumbar kyphosis
  - Lumbar lordosis, potential spondylolisthesis
  - Functional scoliosis, short leg, low and prominent abdomens
  - Foot strain
- 4. Congenital anomalies
  - Wedge-shaped vertebrae
  - Extra ribs, rudimentary ribs
  - Extra lumbar vertebrae
  - Spondylolisthesis
  - Sacralized transverse processes
  - Lumbarized sacral body
- 5. Malignant disease
  - Carcinoma of the bone
  - Sarcoma
  - Tumors of the cord
- 6. Diseases of the abdominal viscera
  - Ptosis
  - Stomach ulcers
  - Pelvic organs
  - Uterus, prostate and bladder
  - Kidneys

Symptoms. General. Some are common to all the conditions so that it is often difficult and sometimes impossible to diagnose the condition. The patient often gives a history of irregularly recurring attacks of lumbago or pain in the lower back. Pain may be complained of in the small of the back, over one or both sacroiliac joints, over the sacrum and in the region of the coccyx. Sciatica is a symptom which is common to many lame backs, and it is difficult to persuade oneself that it is always due to some irritation in the sacroiliac joints. There may be pain along other nerve trunks, the iliohypogastric, ilioinguinal, superior gluteal, external cutaneous and anterior crural. The back pain may be increased by long standing or stooping. A sneeze may precipitate a violent sciatica. In women, backache may be increased during the menstrual period.

Diagnosis is based on:

History
General physical examination
Examination of the spine
Examination of the extremities
Neurological examination
Carefully taken roentgenograms

History. It is important to get the

history of the onset, number and frequency of attacks, duration and severity of each one, occupation, age, social status, amount of disability, what produces the greatest disability, what the position of comfort is, the location and description of the pain, evidences of infection and the gastro-intestinal story.

Physical Examination. Smith-Petersen[1] has emphasized the importance of a careful and complete examination of the spine and extremities, analyzing each sign and symptom with a view to localizing the lesion producing the discomfort. In the process of securing a careful history and making the examination it is very necessary to size up the mental reactions, stability and attitude of the patient. We should note the attitude in the recumbent, standing and sitting positions, and also the attitude in assuming these positions from one of the others. The gait should be studied noting the lifting function of the lateral trunk muscles, and the position of the legs in standing shoulders, chest, arms and abdomen and back, both from the front and side; note local prominences, measure the circumference of the chest, inflated and deflated. Measure the length and circumference of the legs.

Next it should be noted whether there is muscle spasm, tenderness over the spinous processes, along the ribs, at the iliovertebral angle, over the sacroiliac joints, over the coccyx and the symphysis pubis, along the course of the nerves in the buttocks, abdomen, and thighs. Lateral compression of the pelvis should be done, also a rectal examination.

All the spinal motions should be tested out from the head down in sitting, standing and lying. Straight leg raising of each leg to test for discomfort and of both straight and flexed to discover limitation over the lumbosacral region. Hyperextension of the thighs, singly and together; certain neurological tests should be made especially for disturbances of reflexes and sensation. And finally a front and side roentgenogram of the spine and pelvis, also a stereoscope of the lumbar and sacral region and pelvis are necessary.

[1] Smith-Petersen, M. N. Routine examination of low back cases, etc. *J. Bone & Joint Surg.*, 6: 819, 1924.

CONSIDERATION OF THE CAUSES

Arthritis. Arthritis of the spine is seen quite frequently. It may occur primarily in the spine or be associated with arthritis in other joints. In many of the so-called primary arthritis cases of the lumbar spine one will often find limitation of lateral flexion of the neck due to arthritic symptoms there. In these cases there is pain in the lumbar region and sometimes in the buttocks and thighs. The lumbar spine is usually flattened, there is more or less limitation of motion and muscle spasm. The change in physiology of the lumbar spine affects all the other curves so that in addition to the arthritic condition we have to deal with the whole spine as a mechanical problem.

In general the treatment involves a thorough search for the cause and in the majority of cases we may locate it either in the teeth, tonsils, sinuses, genitourinary or digestive tract. Chronic constipation, even the mildest grade, is probably responsible for a large percentage of all arthritis. Faulty diet, low metabolism rate and obesity are other contributing factors in the cause.

The treatment is: removal of the cause, regulation of diet and improvement of the metabolism rate.

Trauma. Most of the traumatic backs are seen in the industries and are due to attitudes which the worker must assume at his occupation, whether in the productive or the executive departments. Many sprains and strains are seen because the type of work done constantly subjects the low back to an almost constant strain and stress. There are industrial accidents which produce fractures of the transverse processes or bodies of the vertebrae themselves. The first result from heavy blows or falls in which the patient lands on one buttock tearing off one or more transverse proc-

esses. The compression fractures result from the patient being crushed from above while sitting or from bad falls when he may land on his feet or buttocks. Such fractures usually take place anywhere from the last dorsal to the sacral region.

The problem of the industrial back is complicated by the insurance, by finding evidences of arthritis in the spine which was symptomless before but now prolongs the original condition because of the irritative injury in the neighborhood of the arthritis; and also there is seen too often an associated functional neurosis giving major symptoms with a minor injury, or due to malingering in order to avoid work and secure compensation.

The so-called railway or functional spine is often seen when there is no money compensation whatever. A diagnosis of functional neurosis is too often made when there is some real pathology present. He who is prone to make a diagnosis of functional neurosis should not do so until he has carefully ruled out all possible pathological causes of backache. Once such diagnosis is made, all the art of medicine must be brought to bear in order to relieve the patient of what to him is a real lesion. Above all the worst advice is to tell the patient that his trouble is imaginary, for then he will not believe and will proceed on a wild hunt for some one to cure him, and the chances are that he will run the gamut of all the cults, cursing and criticizing all doctors for their total ignorance.

Sprains and fractures of the transverse process produce pain, stiffness, limitation of motion, muscle spasm and flattening of the lumbar spine withall their attendant disabilities. In compression fractures there may be no early symptoms whatever, but later on, as bone begins to form, we have many of the symptoms of lame back, and sometimes a small kyphos appears, and a good side roentgenogram will reveal the nature of the trouble.

Static or Postural Defects. Under this heading there will be included so-called epiphysitis of the spine which may be local or general and produce a short or a long kyphosis as the case may be. Some roentgenograms of spines representing this condition were shown to the A. O. A. in 1921 by the late R. W. Lovett. Later on Buchman[1] showed some similar plates and called it epiphysitis.

In my opinion this condition is dependent on an incisura of the anterior portion of the bodies of the vertebrae. Attention was first called to it by Engelmann[2] in 1915. Every newborn baby has an incisura. It is a V-shaped depression in the anterior aspect of the spine, filled with soft cartilaginous material. It often persists late into childhood. Superincumbent weight and deficiency diseases may result in a compression of the anterior aspect of each vertebra and the individual bones become wedge-shaped, sometimes elongated anteroposteriorly, the cartilaginous surfaces are roughened in many cases and sometimes there are small wedge-shaped plates on the superior and inferior aspects of each body anteriorly. Later, in adult life, these wedge plates resemble the osteophytes of arthritis. A great many of these patients develop very stiff round shoulders.

Round Shoulders. Round shoulders are also due to bad attitudes, and the lumbar curves may be increased so much that the angle of inclination of the pelvis is nearer 90° than the normal 50° or 60°. This results in a tremendous strain at the lumbosacral junction, producing considerable pain and discomfort. The pain is usually localized in the sacrum, both sacroiliac joints, or at the lumbosacral junction. All motions may be free. Low and prominent abdomens produce similar conditions, but the thorax is more apt to be held back over the pelvis so that the chest is posterior to a central perpendicular line through the pelvis.

Functional Scoliosis. Functional scoliosis may be a cause of backache especially

[1] Buchman, J. Vertebral apiphysitis; cause of spinal deformity. *J. Bone & Joint Surg.*, 7:814, 1925.

[2] Engelmann, G. Zur Aetiologie der habituellen Skoliose. *Ztschr. f. Orthop. Chir.*, 35: 256, 1915.

located in the sacroiliac joints. It is usually due to a short leg or to the pelvis not being level from some anatomical inequality. The result is a total curve of the spine to the left in 90 per cent of the cases. Such a curve from its leverage can produce symptoms of lumbosacral or sacroiliac strain.

Congenital Anomalies. Wedge-shaped vertebrae cause scoliosis and may produce low back pain. Rudimentary ribs in the low lumbar region are short and may be a source of irritation after injury, so also may extra ribs on the first lumbar, especially when unilateral. Spondylolisthesis is a dislocation forward of a vertebra and is usually: seen at the fifth lumbar. It may be due to injury or it may be congenital in origin and is caused by a failure of union between the pedicles and the laminae. This condition causes low back pain and sciatica, and limitation of motion. The sacrum is very prominent, the buttocks seem high, the waist line short, and there is usually a transverse sulcus in the soft parts at the waist line.

Sacralized transverse process is a projection downward to the ilium or sacrum of the transverse process of the fifth lumbar. The size of the process varies; sometimes it is so large as to take the place of one-fourth of the upper part of the wing of the sacrum. Injuries of the low back may irritate the articulation of the sacralized process and give rise to limitation of motion, muscle spasm, sciatica and backache. The sciatica may be present on the side opposite to the lesion.

Lumbarized sacral body is not very common, but when present it increases the liability to back strain as also do sixth lumbar vertebrae, because the waist line is lengthened and it becomes correspondingly difficult for patients with these anomalies to stand the stresses of posture and occupation.

Too often, no doubt, backaches are ascribed to the discovery of some congenital malformation, as it is convenient to have something abnormal present with which to satisfy ourselves in making a diagnosis. We should remember that many of these patients have had their anomalies all their lives, but not all of them have had backaches all their lives.

Malignant Disease. Malignant disease of the spine is not very common, but it is seen often enough and missed many times because the examination has not been complete. These patients suffer a great deal of pain in the region of the growth and may develop cord symptoms. The diagnosis is usually made by the roentgen ray. A search for the primary lesion should be made in order to confirm the diagnosis, unless the source is already known. Tumors in the spinal cord often produce vague symptoms of backache; here a neurological examination is necessary and also injection of lipiodol will help.

Diseases of the Abdominal Viscera. Ptosis, ulcer and cancer of the stomach, diseases of the uterus or prostate and stone in the kidney, ureters and bladder may cause pain in the back and should be ruled out.

TREATMENT OF LAME BACK

Severe Cases With Sciatica. Unless one can actually demonstrate pathology of the sacroiliac joint, treatment consists of rest in bed with the back strapped or a tight swathe applied. Occasionally a plaster spica is necessary to relieve the sciatica. Patients learn instinctively to tuck pillows under their knees and lumbar spine in securing relief. Many patients wake up in the middle of the night and find that they cannot go to sleep again. I advise them to get out of bed and sit in a chair for half an hour or so, reading or smoking. On returning to bed they nearly always fall asleep. Some of the very severe cases require codeia or morphine to relieve the intense pain. I have never found a plaster jacket of the slightest use. Most of the lame backs are flat and one of the first indications of relief is a return of the lum-

bar spine toward the normal physiological curve, and any apparatus to maintain relief must be altered to fit this curve. In other words we treat irritable bodies in the line of deformity just as we do hips and knees after the patients get out of bed. In the ambulatory cases a cloth and steel corset is applied. It is so constructed that it fits the lumbar region and buttocks closely. The cloth is cut in such a way that the crests of the ilium are not pressed upon (if they are the corset will ride out of place and then the hold on the abdomen will be lost, thus throwing more load on the spine and the whole body out of balance). This type of corset can be adjusted to suit the changes which occur in the spine due to improvement. In some of the bad ambulatory cases a Taylor back brace is necessary for a short time.

Arthritis may be treated by rest in bed; if very acute, later a well-fitting corset or brace may be applied until the local symptoms disappear. One should not be content with orthopedic measures alone. The dead tooth or infected tonsil should be removed, the diseased sinus properly drained. The intestinal case should have a proper diet, constipation must be relieved, and this is best done in arthritis by the use of some of the oil preparations. Agar-agar may be added. Intestinal massage and irrigations relieve a great many of these patients.

Postural defects are best relieved by support and developmental exercises. If a functional curve is present it may be corrected by wearing a lift in the heel of the shoe. This simple device has relieved many low backaches and so-called sacro-iliac strains. The low and prominent abdomen should be supported by a properly fitted corset.

Foot strain is a source of backache and is usually seen in the highly arched foot with loss or shortness of passive dorsal flexion when the knee is extended. In this type of foot all the posterior leg muscles are short and when the load becomes too great for the feet as a result of either illness or overweight, the patient instinctively assumes bad attitudes to relieve his condition. This condition is best treated by raising the heels temporarily, the use of steel plates in bad cases, and raising the shank of the shoe in mild cases.

Leaving off the support to be decided for the patient. All the signs and symptoms of lame back may have disappeared, but to my mind it is not safe to remove the supporting apparatus, chiefly because there has been severe muscle atrophy as a result of disease and splinting. It would therefore seem necessary to give the patient some exercises to develop all the muscles which support the spine and maintain the erect position. These include the back and abdominal muscles, also the thigh muscles, especially the gluteus maximus. One may properly begin such exercises very gingerly when the patient is able to arch his spine in the forward bent position.

Operative treatment does not apply to arthritis except with tuberculosis. In general, operations should not be done on the spine until all other measures for relief have been exhausted. In traumata, sprains, strains, and fractures of the transverse process, get well with rest, support, strapping, etc. Most compression fractures do well if kept in bed eight to ten weeks, using a plaster or leather jacket, followed by a Taylor back brace for a year or two. A few compression fractures give rise to persistent pain as a result of non-healing of associated features of the laminae or spinous processes. Fusion of the spine should be done under such circumstances.

Sacroiliac Joint Disease. Osteomyelitis and tuberculosis of this joint are best relieved by some form of fusion operation.

Congenital Anomalies. Braces or corsets will relieve most cases. Occasionally the disability from spondylolisthesis and sacralized transverse process is so great that operative treatment is indicated, and a fusion of the spine after Hibbs' or Albee's method gives the best results.

Malignant disease of course is hopeless. These cases may be given deep roentgen-ray therapy and the pain should be relieved by whatever orthopedic and medical measures we have at hand.

Diseases of the abdominal viscera are surgical problems.

SUMMARY

1. The diagnosis of lame backs still belongs to the art of medicine from the point of view of diagnosis. The roentgenogram is a valuable aid when it will demonstrate pathology.

2. In making a diagnosis even the slightest symptoms may be of the greatest importance.

3. It is very difficult with our present knowledge to determine in every case the location of the lesion in the early stages.

4. Traumatic neurosis is a diagnosis easily made but hard to prove.

5. One should not approach a lame back with a preconceived or snap diagnosis.

6. Treatment is based on fundamental principles of rest and protection followed by proper physiotherapeutic measures to effect a cure.

7. Unless malignant, the prognosis in practically every case is good.

EVERYDAY OCULAR INJURIES*

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INTRODUCTION

THE impact of a foreign body against the cornea usually causes immediate pain which is soon accompanied by blepharospasm, increased lacrimation and photophobia. These symptoms arise from injury to the sensory nerves of the cornea directly, or indirectly through reflexes excited by the injury. Occasionally a wound can be demonstrated objectively when it is not accompanied by symptoms because the sensitive nerve terminals have been destroyed or obtunded. Those cases in which unimbedded foreign substances can be removed with a cotton-wound probe will not be considered.

Foreign bodies commonly consist of detached bits of cinder, coal, emery, grains of gunpowder, metal, stone, glass or wood chips. Leaves, twigs, thorns, wheat beards and so forth also can injure the eye. Before proceeding with an examination valuable information may be obtained by inquiring into the patient's occupation and environment at the time of the accident.

EXAMINATION

The examination is made first in good daylight and then under bright artificial light. The eyelids are separated and the patient is made to look in different directions, as the examiner desires, until all of the cornea has been scrutinized; the use of a condensing lens, loupe, or magnifying glass is advantageous. A foreign body may be located with the ophthalmoscope by using convex 7, 16 or 20 lenses at appropriate distances with the illuminated pupil as a background. The next step is to stain the cornea, not only to locate the wound but to determine its extent and depth. A few drops of 5 per cent cocaine solution are instilled, and then a solution of fluoresceine, 2 per cent, combined with sodium carbonate, 4 per cent. After waiting a few minutes the eye is irrigated with boric acid or normal salt solution. A bright green color appears at the site of any recent destruction of corneal epithelium. A circumscribed dark spot in a field of green indicates the position of a foreign body if present; perforating injuries do not exhibit a dark spot.

Photophobia or pain make it difficult or impossible for the patient to keep the lids separated. A few drops of 5 per cent solution of cocaine or butyn in the conjunctival sac generally reduces the disability. A blepharospasm that does not yield to this expedient can be relaxed by injecting 1 or 2 c.c. (16 to 31 drops) of 2 per cent solution of procaine, with or without 0.016 gm. (¼ grain) of morphine sulphate, into the tissues outside the lateral border of the orbit; the injections are made deeply toward the external auditory meatus and the ramus of the mandible. This paralyzes important branches of the facial nerve. The eye should be protected by dressings for at least six hours after the use of any local or infiltration anesthetic. General anesthesia is advised for the examination and treatment of small children.

TREATMENT

The removal of a foreign body should be undertaken only with adequate illumination, effective anesthesia and *aseptic precautions*. A few drops of 40 per cent argyrol solution are instilled into the conjunctival sac and the sac is then irrigated with sterile normal salt solution or mercurophen 1:8000. The lids can be held apart with retractors or an eye speculum. Magnification may be required as for the examination. Normal salt

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solution should be dropped on the cornea frequently to prevent drying of its epithelium. The patient is instructed to fix the gaze on some selected object with *both eyes open*, in order that the eyeball shall be steady in position; a drop of cocaine solution in the uninjured eye is helpful.

Magnetizable substances may be removed with an eye magnet; where they are obstinate the current should be made and broken rapidly to create *jerking* pulls. The removal of small foreign bodies from the cornea may be attempted with an eye spud or needle, or the sharp point of a fine knife, such as a cataract knife. The instrument is worked around and under the body, which is then lifted out. Glass is especially difficult because of its transparency. Powder grains are usually numerous and tedious to dislodge. Iron often leaves a rust stain which may be removed with a fine dental drill rotated by the operator's fingers.

A foreign substance free in the anterior chamber is removed by opening the chamber at the periphery and grasping the body with fine forceps. Where the body is lodged in the iris both are grasped with forceps and drawn out only far enough to permit excision of the part of the iris which contains the body. The lens must not be touched. These surgical wounds do not require sutures, but they should be dressed daily until the anterior chamber has fully reformed.

Patients with foreign bodies situated posterior to the iris should be referred. Foreign bodies in the lens are prone to cause cataract; those in the ciliary body usually cause violent iridocyclitis and those in the posterior segment of the eye are removed only with great difficulty even by experienced operators.

An object can perforate the cornea without remaining in the eye. Flaps are fashioned from the conjunctiva to cover the opening until the cornea shall have been healed and any leakage of aqueous stopped. The conjunctiva is incised 1 mm. from the cornea for about half of its circumference. The flap is formed by undermining the membrane, drawing it over the perforation like an apron and suturing it at each side

Fig. 1.

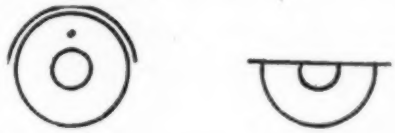
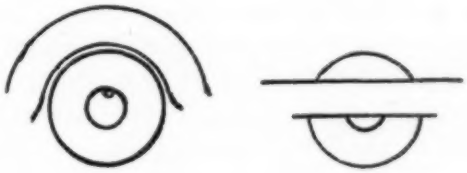


Fig. 2.



of the cornea with fine silk (Fig. 1). If the perforation is central it is better to fashion a double pedunculated flap. The first incision is made as in the former instance and another concentric with it and 5 or 6 mm. more peripherally. The flap is undermined, brought over the wound and fixed in place by sutures outside the cornea (Fig. 2). No suture or loose ends should lie in contact with corneal tissue. Ordinarily the sutures can be removed in five days.

A neglected foreign body in the cornea may be overgrown with epithelium and become encysted. If infection is present an abscess will form; it should be incised promptly, cleansed by gentle irrigation, *dried* and then painted lightly with pure phenol. Otherwise the abscess may rupture and perhaps expel the body or it may lead to loss of the globe. Cases of intraocular infection should be referred.

BURNS

Burns are caused by boiling liquids, steam, acids, alkalies, lime, flame, curling irons and splashes of molten metal. Anesthesia is required as for foreign bodies. All particles of alkali, lime or metal must be removed from the cornea and conjunctival sac. Lime tends to produce permanent opacities in the cornea; these cases are treated by removing the particles with forceps, sponges and irrigations with freshly prepared 2 per cent aqueous solutions of neutral ammonium tartrate or

ammonium chlorid. These irrigations may have to be repeated daily or oftener for some time. The solution of the tartrate should be gradually increased in strength up to 20 per cent if tolerated.

Small losses of conjunctiva can be repaired early with grafts of mucous membrane cut from the inner surface of a lip, but in the case of alkali, metal or other deep burns the flap will probably be lost by sloughing unless its application is postponed until the inflammation shall have subsided. In burns involving the conjunctiva of the lids and the cornea flat pledgets of cotton impregnated with bichloride ointment should be placed between the two structures as deeply as the wound extends into the cul-de-sac to prevent the formation of a symblepharon.

Ether may enter the eye accidentally during its administration for anesthesia; it causes a painful but superficial lesion. Phenacaine ointment and bandage are applied as often as necessary to control pain.

DRESSINGS AND AFTER CARE

At the conclusion of the initial treatment for foreign bodies or burns the conjunctival sac should be irrigated with a solution of mercurophen or mercuric chloride 1:8000. A drop of 1 per cent solution of atropine is instilled; a drop of 1 per cent solution of phenacaine hydrochloride (holocaine) may be added. Ointment of 1:3000 mercuric chloride, made up with petrolatum and lanolin as a base, is placed beneath the lids and the closed lids are covered with an eye-pad or bandage. The patient may be supplied with a solution of phenacaine for pain and some bichloride ointment for dressings. Instructions are given about proper care, the liability of infection and its consequences, and the reasons for reporting promptly should the eye become red or painful. In mild cases the dressings may be discontinued after twenty-four hours. Severe cases require further attention. Painful wounds sometimes need dionine in 5 or 10 per cent solution or ointment two or three times a day. Phenacaine may be combined with the dionine.

Some apparently healed corneal wounds are characterized by instability of the new epithelium. When the patient opens the eyes on awaking, the lids scrape off the new cells and pain of a few hours' duration ensues. Such eyes should be dressed with 5 per cent dionine ointment or 2 per cent yellow oxide of mercury ointment at bedtime. White opacities occasionally remain in the cornea after healing has been accomplished; in recent cases 10 per cent dionine and light massage daily are often of benefit in helping to restore transparency.

CONTUSIONS

Contusions of the eyeball are frequently followed by an edema of the cornea with clouding which may resemble an interstitial keratitis. The history of injury, prompt appearance of the opacity and an early recovery will be of help in making the differentiation. Sometimes an attack of true interstitial keratitis is precipitated by a contusion in congenitally syphilitic patients; unilaterality is characteristic of this condition. The treatment of contusions is by cold compresses for ten minutes every two hours, dionine in 5 per cent solution or ointment twice daily and light massage once daily. Whenever the cornea is insensitive the eye should be protected with ointment and bandage.

Hemorrhages sometimes occur into the anterior chamber after trauma. The coloring matter of the blood may stain the cornea; clearing begins at the periphery, but the restoration of transparency is greatly delayed and often incomplete.

THE SIGNIFICANCE OF THE INFLAMMATORY REACTION FOR SURGERY*

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MC GREGOR, MINN.

OUR knowledge of the field of the inflammatory reaction is still vague and unorganized. There is scarcely a branch of the natural sciences in which so many varying opinions can be found as to the significance, function and use of the inflammatory reaction.

In the following pages an attempt is made to emphasize some important points in the general knowledge of this topic, to add some new ideas on the subject, and to set forth systematically the significance of the inflammatory process for surgery. Only the necessary facts on the subject of inflammation are cited, and details of morphology and specific processes are omitted.

I am taking the liberty of adding to the literature on this subject because of the fact that in the last four years I have carried out many hundreds of experiments on men and on dogs. The object of these experiments was to change fat and connective tissue into reacting tissue, resembling granulation tissue. This was attempted by injections of chemical substances or by other means associated with the least amount of tissue damage. It is quite probable that such tissue (that is, granulation tissue), rich as it is in blood vessels and young plasma cells, can be utilized for its effect upon infections, the healing of wounds, and other therapeutic purposes. Details of the experiments and bibliographical references are given in previous publications.[1] The present article purposes merely to draw a broad picture of inflammation as revealed in the cited experiments, without giving the detailed protocols.

Inflammation may be defined as an active local reaction on the part of the tissues. The practitioner sees this phenomenon usually as the result of bacterial infection. It has been well known for forty years, however, that exactly the same type of inflammatory reaction can be produced in other ways, as are caused by burns, chemicals, rays, operations, etc. A sterile cell destruction brought about, for instance, by the injection of a hypertonic salt solution, can produce the same clinical picture as a streptococcus phlegmon. In spite of this even the best and most recent authors use infection and inflammation as synonymous terms. In this article these two terms are differentiated. The active rôle of bacteria and their power of multiplication and dissemination in infection are of secondary importance compared to the tissue destruction caused by them. This point of view is justified by the similarity existing between the inflammatory processes effected through bacteria and through the tissue destruction resulting from chemicals.

The real key to the understanding of inflammation is the knowledge of the relation between inflammatory reaction and tissue destruction or impairment. There is doubtless a relation between the two, but it is meaningless to explain the inflammatory reaction as the result of tissue impairment. It is quite apparent that often the extent of tissue destruction is in no proportion to the degree of reaction.

We see for instance, in the case of a

[1] Strauch, C. B. Ueber die klinischen Grundlagen einer lokalen Reiztherapie. *Arch. f. klin. Chir.*, 145: 42, 1927.

Ueber Reizstoffe und ihre Wirkung im Hinblick auf eine lokale chemische Reiztherapie. *Arch. f. klin. Chir.*, 146: 97, 1927.

* Submitted for publication Sept. 26, 1928.

severe traumatic crushing of an entire extremity with extensive tissue destruction, that the inflammation sets in much later, and that it occurs for the most part in places where there are no skin lesions that might prevent or diminish the resorption of broken-down tissue elements. Even should extensive areas become infected, the inflammatory reaction may be minimum if abscesses or phlegmons, that is, bacterial foci within the tissues, do not develop. Nor is there necessarily a direct ratio between a necrosis and the accompanying development of an inflammation as is proven by the customarily small inflammation around embolic infarcts, or, at the border of a bland mummification of an extremity caused by injuries to the vessels. In such cases, when we assume that a certain invasion of the intact tissue by substances of decay takes place, a moderate demarcating reaction develops slowly. Even in local infection the inflammation is not proportioned to the damage of the tissues. A typical case of panaritium starting with a subcutaneous, yellowish, discolored, small focus on a finger, discloses that the entire arm is edematous, reddened and showing flame-like streaks of lymphatics leading to enlarged axillary lymph nodes. A surgical incision now adds further damage to the infected area and after a few hours the bacteria have spread throughout the entire wound, but the inflammatory reaction, up to the nodes in the axilla, has almost disappeared.

In this case, too, the degree of inflammation can be better compared with the extent of the resorption from the diseased focus than with the amount of tissue destruction. Such examples can be cited ad infinitum. Every surgeon knows that where he deals with prolonged signs of an acute inflammation (redness, swelling, etc.) he has to do either with a diffuse spread of toxin-producing bacteria such as erysipelas or phlegmons, or with a local, limited, for the most part suppurative and bacterial focus, which loses its inflammatory characteristics soon after being opened.

These few examples suffice to demonstrate the function of the inflammatory reaction as "the attempt of the surrounding tissue to prevent the resorption of elements of tissue destruction and of the assembling of bacteria. The rôle of tissue impairment, aside from the fact that it is the nidus of the infection, is merely that of a depot from which a prolonged flow of destroyed tissue elements takes place. An inflammation will be caused in all parts of the body where a parenteral absorption of certain materials takes place, especially if the substances absorbed are albumins and toxins. The extent and the duration of the inflammation agree with the area of resorption and its duration. It is not the damaged areas which suddenly acquire an increased functional ability, but rather the dormant, intact forces of the surrounding tissue which react to the invasion of certain substances not belonging to the highly specialized albumin structure of the body. The sensitiveness of the nerve endings and of the capillaries may serve in the same manner after parenteral invasion as do taste and smell at the portal of oral supply, and have warning and controlling functions.

Each inflammation reaches maturity with the formation of granulation tissue. This granulation tissue may be found on the body surface, the floor of ulcers, in wounds healing by second intention, in opened abscesses, etc., or it may consist of tissue infiltration. The granulation tissue, rich in protoplasm, and aided by the plentiful blood supply, is the means by which the body creates what may be regarded as a new skin which acts as a bar against the parenteral resorption of foreign elements. It is well known that a wound daily acquires greater resistance to injury, so that after from three to seven days the granulating surface acts almost as well as healthy mucous membrane or as skin in respect of impermeability. New formation and growth require time and it is for that reason that the formation of regular granulation tissue is to be looked

for only where resorption has lasted a sufficiently long period.

In the course of granulation tissue formation the single components of the inflammation complex working constantly together have a practical subfunction. Edema probably has the purpose of diluting and resorbing substances destructive to the tissues. Purely fibrinous exudate is known to act as a speedy encapsulator. The pus cells are of importance mainly as carriers of protein solvent ferments. Necroses, foci of infection and many chemical substances, particularly plant albumins, attract them, leading to abscess formation. The phagocytic function is to be regarded as relatively unimportant when one takes into consideration the prolonged presence of bacteria in empyemas and the ease with which tubercular and chemically produced abscesses can be infected secondarily. These three phases of the inflammatory mechanism can be stimulated quickly, whereas the work done by the granulation tissue is slower but more effective. The pus cells are capable of advancing as far as the focus of infection, there to counteract it.

A comprehensive survey of all experiences up to the present and my extensive experiments with more than one hundred substances of various kinds, give no indication as to how an "optimal," purely reactive tissue change can be produced with any one of the known substances at hand. All substances producing marked inflammatory reactions did not produce a primary inflammation. They only destroyed the tissue and the gradual and continuous dissemination of the tissue proteins into the adjoining tissues, and the lymphatic system effected the inflammatory barrier. The substances originally injected, if they are not at once made ineffective by necrosis, are resorbed long before the inflammation sets in and continues. Substances causing decided inflammation, like Croton oil, turpentine, salvarsan, cantharidin, etc., are merely substances having the property of marked tissue destruction. At first it was surprising to find after injection of such substances extensive necrosis and cavities surrounded by only a small reactive zone.

We have in addition to the tissue damage in a case of local infection the continual discharge and absorption of bacterial proteins and toxins. A very limited tissue damage, such as the core of a furuncle, may for a long time maintain an inflammation through the steady production of the substances that nurture it. Renewed tissue damage is not necessary.

An inert substance producing a mild but continuous effect upon the surrounding tissue through the slow solution or discharge of its elements, which can be implanted into the tissue, should be able to produce and maintain an inflammatory reaction with but little or no tissue destruction. Such pure reactions can be brought about with substances resorbed with difficulty, such as oils, fats, waxes, paraffins, iodoform, agar-agar, kaolin, etc. It is questionable, however, if one assigns to the protein substances the special rôle of producing inflammation, whether the thus created, relatively small and slowly developing tissue reactions do not belong rather in the realm of formative irritation.

Together with Dr. H. Bernhardt, University of Berlin, I have worked out a method which permits the slow resorption of any water-soluble substance once it is injected. Up to the present this method has proven practical and successful only in the application of such drugs as insulin, adrenalin, strychnine, etc.

Inflammation was defined as the attempt to prevent resorption. The meaning of this is that tissue able to react is not always successful in doing so. Fever, which is the general reaction of the organism in the same direction, is a measure of the substances that have gained admission into the circulation in spite of the inflammation. It is known that it is mainly the mobilized or introduced protein substances that cause the reaction. These protein substances also represent the most important

antigen for the third great reaction (the specific one).

The degree of the fever reaction as well as the extent of the inflammatory process is determined, on the one hand, by the degree of toxicity of the products and on the other hand by the amount of pressure with which they are diffused into the tracts of resorption. The old therapeutic postulate of pressure relaxation of infected foci by means of broad incision agrees with the conception of inflammation emphasized here. Every inflammation with the distinct signs of redness, heat, swelling and pain, is a proof that foreign protein substances are absorbed under pressure. A release of pressure through incision is therefore always indicated except in some special instances (such as gonorrhea, tuberculosis, etc.). Pus will be found if the focus has attracted a sufficient number of leucocytes. The incision, however, also releases the pressure of a phlegmonous focus before suppuration sets in. The protective power of the inflammatory barrier is generally great enough to prevent continued damage and further absorption of infective elements from open and shallow wounds.

We have seen that the inflammatory reaction plays an important protective rôle in the protein economy of the body and that its components, such as edema, fibrin, pus and its ultimate aim, the formation of granulation tissue, have each their important special functions. The continual, doubtful interchange of the terms infection and inflammation is probably responsible for the fact that, except in a few cases, no attempt has been made to utilize the possibilities in this field therapeutically. The poison-diluting action of the edema is similar to the infiltration of the tissues with physiologic salt solution after accidental paravenous salvarsan injection. The treatment of wounds containing tendon or bone necroses with leucotactic substances or proteolytic ferments is probably aided by the dissolving action of pus.

The production of tissue is closely allied to inflammation. We often observe that a prolonged, mild infection of bones produces changes which we would be glad to bring about if this could be done in a well-regulated and harmless manner in cases of poorly healing fractures, in pseudo-arthroses, in stiffening joints and lengthening of bones. Suggestions of other therapeutic possibilities which can be derived from infections are: Metaplastic bone formation in the tissues, acceleration of healing of wounds, softening of scars and creation of supporting tissue; increase of resistance of the tissues and eventually influence upon chronic infections, new growths, etc. We follow the same principle when we produce a venous thrombosis in varicose veins by injections or stimulate slowly healing epithelium with scarlet-red ointment and the growth of granulation tissue by means of other substances long in use.

For the present surgery must be satisfied with the use of purely mechanical means since it is not able to make plastic, functional and formative impressions upon its fundamental working material, the supporting, connective and vascular tissue. The three great reactions of the organism are: (1) specific defense (antibodies, etc.), (2) systemic reaction (fever, leucocytosis, etc.), (3) local reaction (inflammatory and productive processes). Since the first two are utilized successfully in so many therapeutic ways it is to be expected that future therapy will also be enriched by the third reaction.

PRURITUS ANI

VS. THE GENERAL PRACTITIONER*

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NEW YORK

THERE are many situations which the general practitioner meets that remind him of that popular cartoon "When a Feller Needs a Friend," but there is probably none in which that phrase more aptly applies than in the instance of an inveterate case of pruritus ani. Textbook suggestions and a host of pet prescriptions come to naught when brought face to face with this very trying clinical problem, a problem that is as trying to the physician as it is to the unfortunate sufferer. Indeed many a hard-earned reputation of being a thoroughly up-to-date doctor has been dashed to splinters on this clinical reef.

A recital of the symptoms of this malady is hardly necessary in a practical paper such as this, particularly since that of itching dominates all others, an itching that seems in its selection of those hours ordinarily reserved for rest for its agonizing antics to be imbued with personal malice. Weary with the day's labor the patient retires for well-earned slumber but almost as soon as he has become thoroughly comfortable the petulant torture of itching descends upon him. To obtain relief prolonged and unreasonably vigorous scratching is indulged in and such a procedure only results in abrasions which in turn are irritable, become infected and give rise to further itching.

I have pictured these circumstances no more darkly than they actually occur, and while it is true that I have painted a severe case, I do so in order to impress upon the reader the seriousness of the situation when considered from the patient's standpoint and also to overcome, if possible, the regrettable levity with which the situation is viewed by many of our confreres. Let us agree, therefore, that it *is* a serious state of affairs and one that cannot, with justice to the patient, be lightly dismissed with a smirk and a stock prescription.

Every case of pruritus ani is definitely curable. Every case is entitled to be cured. As to exactly how this may be accomplished in any particular case may best be decided after reading the following suggestions. They are made on the basis of what I believe to be a rather extensive and intensive experience with pruritus ani. Since the publication of my book entitled "Pruritus of the Perineum" I have seen and treated 391 cases of pruritus ani; of these I have had reliable reports from 349. The experience acquired as a result of handling pruritus cases in such numbers is serving me well as a guide in my present handling of that type of ailment and it is this experience which I feel may be found of real practical guidance to others.

The things one should *not* do in a case of pruritus ani are to my mind of even greater importance than those one should do. Certainly it will be agreed that if we cannot help the unfortunate sufferer we can at least refrain from doing him an injustice or actual harm. As a specific instance of the latter there come to my mind a more than moderate number of bad results in cases that have previously been treated with roentgen-rays. From such a case may the clinical gods deliver us! In place of or in addition to, the skin condition of pruritus we have a roentgen-ray burn which is as difficult to heal as it is easy to acquire.

No one will deny that there are cases of pruritus which are apparently relieved by roentgen-ray treatments; however, it

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should *not* be denied that many cases are not relieved and some are actually aggravated, while others are burned in the zeal to obtain results. These observations prompt my first negative suggestion: do not use roentgen-rays in the treatment of pruritus. We know too little about the action of roentgen-rays and its possible relation to cancer origin to employ indiscriminately an agent whose effects we cannot control.

Ultraviolet or quartz light therapy, though by no means as dangerous as roentgen-ray therapy, does often result in an aggravation and apparent extension of the pruritus.

Prolonged use of ointments containing carbolic acid also carries with it unpleasant possibilities. So, too, does the use of belladonna ointment and cocaine suppositories. Opium suppositories and morphine particularly should be avoided in pruritus cases, partly because of the danger of habit formation when used in so chronic an ailment, and partly because of the specific property of these drugs themselves to cause itching. This may often be observed in cases given morphine for other reasons. The itching nares and sometimes generalized itching which accompanies the uses of this drug is alone sufficient reason to exclude it in the treatment of pruritus ani.

Shaving the parts is often done in an endeavor to aid in local cleanliness and to permit the more direct application of ointments. My own experience has been directly contrary to that which holds shaving to be an advantage. I have found that when the root hairs proceed to grow, as they do in a few days, they are so bristle-like that by their very presence they irritate the skin on the opposite side of the perianal region. This incites further itching and scratching with definite aggravation rather than relief.

Aside from all the above negative suggestions I believe we should realize the gross injustice of proceeding to any form of treatment in pruritus cases without a preliminary examination, not only of the perianal region, but of the entire anal canal, rectum and sigmoid.

Moreover, I believe that every case is entitled to a thorough complete physical examination. This surely should include urinanalysis and possibly a blood chemistry examination. In this way we will avoid the embarrassment of discovering that we have been wasting perfectly good roentgen-ray skin doses on a case of carcinoma of the rectum which we might better have recognized and treated as such instead of its associated symptom of pruritus. Nor will we treat cases of diabetes with some ridiculous unguentum while neglecting general treatment.

As a definite plan for approaching the problem of treating any specific case of pruritus ani I have adopted the following routine as a guide. It is varied according to the requirements of the individual cases but at least it has an advantage of guiding one's observations and endeavors along rational lines. One of the first questions which I ask a patient suffering from pruritus ani is whether he has itching on any other part of his body. In this way my attention is brought to those cases which at the outset are known to be of more than local concern. I then ask the patient what itching disease he has had in order to establish any tendency toward food allergy. Next I ask the patient what treatment he has already had for this condition. I believe it will be readily understood that the latter is an important question since I have seen cases in which carbolic acid burns were big factors in the clinical problem presented. The same applies to the matter of roentgen-ray burns. In the face of this and similar obstacles to treatment one should be in the full possession of the facts. Another question upon which the patient can give help is the matter of his diet. Where this has been particularly flagrant in its departure from reasonable food demands we are furnished with a clue as to possible intestinal causes for his disorder.

Following these questions and what other questions seem pertinent to the problem, I proceed to a thorough examination of the perianal skin for local causes. As to exactly what these may be I suggest a perusal of my monograph "Pruritus of the Perineum."

Aside from the matter of a thorough rectosigmoidoscopic and general examination, which incidentally I consider the first step in the matter of treatment, there are three other steps to be taken. Foremost among these is that of immediate relief and for this immediate relief one should certainly not employ morphine or other habit-forming drugs. We should employ some procedure which will give relief not only during the sleeping hours, but also during the waking hours of the patient. There is no drug which can quickly and completely give this relief without harming the patient. There is, however, a procedure known as the undercutting operation which can be employed without jeopardizing the patient's general condition.

The undercutting operation is a very simple procedure which consists of the severing of the sensory nerves immediately under the skin in the perianal region. This is done by means of a special pair of scissors shown in Figure 1, through small incisions as indicated in Figure 2. It is an extremely simple procedure and may be done under local anesthesia in ten minutes or less. The rationale for the employment of this operation is as follows:

Itching causes scratching and this scratching damages the skin. In the repair of this damage, fibrosis of the papillary layer of the corium occurs and in the inevitable contraction of this newly formed fibrous tissue the sensory nerve endings in this area are compressed. Compression gives rise to a stream of irritant stimuli which in consciousness are recognized as itching. The itching naturally gives rise to a further desire to scratch. We have, therefore, a vicious circle as follows: Itching causes scratching: scratching indirectly causes fibrosis and this in turn by compressing the nerve endings causes increased itching. Now, therefore, if we break this vicious circle by severing the nerve endings we allow the skin sufficient sensory rest to accomplish healing. The operation is only part of the cure and its main object is to allow the correction of the skin damage done and to prevent the occurrence of further skin damage.

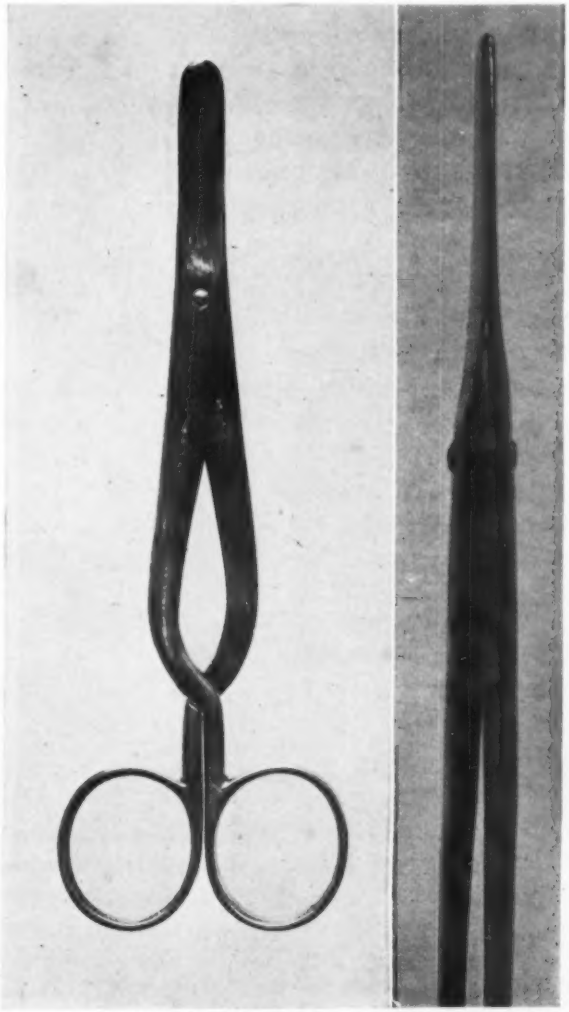

Fig. 1. Double-edged dissecting scissors for use in undercutting operation.

In early cases in an attempt to avoid this operation the skin in the pruritic area may be treated by cauterizing the exposed sensory nerve endings. This is for the reason that when excoriation occurs the minute filaments of the sensory nerve endings are exposed to the air, to the action of mucus and other secretions. The irri-

tation which naturally results from such an abnormal state of affairs gives rise to an increased desire to scratch. To avoid the establishment of what thus threatens to be a vicious circle, such an area should be cauterized with a 10 per cent aqueous solution of silver nitrate. Such cauterization is of great temporary value and if supplemented by protective ointments will do much to avoid further skin changes.

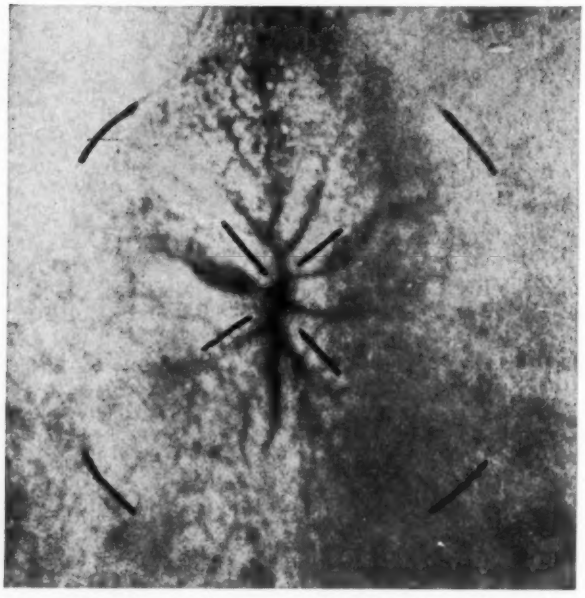

Fig. 2. Position and extent of incisions in undercutting operation.

The object of protective ointments is to exclude air and particularly water from the exposed sensory nerve endings just mentioned. Almost any bland ointment is as good as another for this purpose. Vaseline, boric ointment, zinc oxide ointment made from lanolin or Lassar's paste are those which I most commonly use for this purpose. Mild protective ointments such as the foregoing will be found much more satisfactory than the anesthetic ointments since the latter are exceedingly prone to become intolerable to the skin.

The employment of vaccines has been suggested for many years and while the method has had its deterrents, I myself have had gratifying results from the sensible employment of vaccines. By the sensible employment of vaccines, I mean the utilization of those vaccines which may reasonably be supposed to be capable of exerting beneficent influence and moreover the use of these with a full understanding of what they are intended for and, what is more to the point, what they are not intended for. As an example of the latter I might mention that vaccines employed in pruritus ani are not intended as a means of removing primary causes such as local pathology or visceral disease. Their one and only purpose is to raise immune resistance to those organisms which have been demonstrated to be actual invaders. The vaccine I use is pruritus vaccine, Lederle. I have used it in the previously mentioned series of cases and believe it has done much to minimize the low-grade dermal infection which is always a possibility in these cases.

It will be noted that in all the foregoing I have avoided the unfailing admonition of every textbook writer who reluctantly gives a paragraph to the problem of pruritus ani. The instruction I refer to is "remove the cause." I believe that the foregoing has contained enough worthwhile advice to pardon the repetition of so old a maxim and I believe that if my suggestion of a thorough rectosigmoidoscopic and general physical examination be followed out that this instruction will come nearer observance than when it is merely accompanied by an "unfailing remedy."

Visceral pelvic diseases as a cause of a misreferred pruritus should always be considered. Much greater detail on this very important phase of pruritus ani will be found in my monograph on the subject. If the comments offered herewith induce a more rational view with respect to the analysis and treatment of pruritus ani cases than is customary, I am sure that there will be numerous grateful patients throughout the land. In the field of rectal diseases there is no greater certainty than this: *Every case of pruritus ani can be cured.*

THE INJECTION TREATMENT OF VARICES & ULCERS OF THE LOWER EXTREMITIES*

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WHILE arterial circulatory disturbance of the lower extremities is but a recent chapter in medicine, the recognition of venous disturbance dates back to Hippocrates, who noticed the relationship of varicose veins to ulcers of the leg. It was more thoroughly studied by the Alexandrian school and by Galen and his pupils. They stressed the importance of disturbances of the venous system in the etiology of recurrent ulcers of the leg, and they even made attempts at surgery. They tried to remove the blood from these veins, which they termed melancholic or black bile blood. Aegelleta in the 15th century spoke of the danger of varicose veins and also of their relation to ulcers of the leg. He condemned meddling with these veins, and believed that meddling would cause hydrops, phthisis and mania. Later, a good deal of attention was given to this subject by Paré and his pupils. Still later men like Morgagni, Valsalva and John Hunter studied the subject thoroughly and they considered that the stagnation of blood in these veins was the sole cause in the pathogenesis of ulcers of the leg.

Various theories have been advanced as to the cause of varicose veins. We believe, however, that no one of the following factors is the sole cause: Sicard of Paris considers this condition due to an endocrine disturbance of the ovary and pituitary body. Some of these cases are undoubtedly due to this cause and are seen primarily in young women who have large thick legs, who may give a history of definite menstrual disturbances and may present other evidence of endocrine disturbances, such as excessive growth of hair on the lower extremities. Meisin believes the condition is due to a general weakness of the structures of the veins, and associated with it may be other evidences of body tissue weakness, as flat feet, enteroptosis, etc. Undoubtedly this cause plays a very important rôle in a great majority of cases. Kashimure, a Japanese surgeon, believes it is due to loss of neuromuscular tone in the vein walls. Others believe that syphilis plays a very important rôle in the etiology (Zinsser and Phillips).

On the other hand, such authorities as Fisher, Noble and Renzi believe that varicose veins are due to an infection involving the vein wall, probably embolic in nature, often superimposed upon a hereditary predisposition. There are undoubtedly a number of cases in which one or more of these factors play a definite rôle in the causation. We are of the opinion that in a great number of cases trauma, producing inflammatory or cicatricial bands, constricts the veins, producing disturbances in the flow of blood. The action is similar to that of Jackson's bands in the cecum. The lumen of the vein becomes distended and dilated and the elasticity and tone are diminished or entirely lost, producing a stasis of blood in the vein, predisposing to the formation of ulcers and thrombi.

Varicose veins are most frequently seen in women over thirty years of age, although many are noted in younger individuals who have definite evidence

* Based upon a study of nearly 700 cases from the Clinic, Hospital for Joint Diseases, New York. Read before the Clinical Society of the Hospital for Joint Diseases, November 7, 1928.

of endocrine disturbance. Several factors account for their frequency in women. The most common is frequent pregnancies and childbirths. Tumors of the uterus, ovaries, retroflections of the uterus and constipation are also causative factors.

Undoubtedly sufficient muscular activity aids to promote normal circulation in the lower extremities, and we realize the inactivity of women as compared with men. However, since women are entering the various athletic fields, since interest in birth control is widespread and since early surgical intervention in pelvic tumors is now common, we will most likely see a definite decrease in varicose veins in the future generation. Varicose veins are also seen in men, especially those engaged in occupations requiring long hours of standing and heavy lifting.

We have been amazed at the almost entire absence of varicose veins in colored patients. Myauchi calls attention to the fact, also, that it is not a common condition in Japan, and he attributes this to the sedentary life and peculiar sitting posture of the Japanese.

SYMPTOMS

These depend upon the extent of involvement of the veins and the presence of ulcers, eczemas, phlebitis and neurodermatitis. In simple dilatation of the veins the symptoms may not be marked. Such patients will be more disturbed by the visibility of the veins than anything else, and with the modern trend in dressing this is a very disturbing factor to women. Others may complain of becoming easily fatigued from walking. The area involved feels much warmer to touch than the surrounding tissues. In severe cases, where there is phlebitis or periphlebitis, the pain may be severe. There may be fever and other constitutional disturbances producing disability, preventing patients from following their usual occupations. Some patients complain of severe cramps in the legs while walking, hence the German name *Krampfadder*.

TREATMENT

The treatment in the past may be divided into two classes, conservative and radical. The former aims to give relief by means of elastic stockings and other supports. The latter consists of various operative procedures that vary from simple ligation to extensive removal of the veins. The writers believe that in the most radical operations the surgeon cannot hope to excise the various communicating veins. In the writers' series of cases a number were met that showed recurrences following extensive operative procedures (Fig. 1, Case 1).

It is not our intention to discuss the merits of the various methods employed in the treatment of varicose veins. Yet it is our firm conviction that the chemical obliteration of varicose veins is the nearest approach to a complete cure.

The ancient physicians recognized the relationship of varicose veins to ulcers of the leg, and they attempted to obliterate these veins by means of various pastes. Later, attempts were made by perivenous and intravenous injection of chemicals to obliterate these veins. Some of the chemicals used were alcohol, iron, carbolic acid, ergotin, etc., but on account of the occurrences of fatal hemorrhages, infections and emboli, these procedures were given up. These attempts were mainly made following the invention of the hypodermic syringe by Pravaz in 1851. A great impetus was given to this treatment in 1916 when Linser and Zirn, in treating cases of lues by the injection of bichloride of mercury intravenously, noticed the frequency of hardening of the veins, and it occurred to them to employ the same procedure for the obliteration of varicose veins of the lower extremities. After using this solution for a time because of the frequency of mercurial poisoning and other disadvantages they began the search for a non-toxic substance, and came upon a 20 per cent to 30 per cent salt solution. Sicard and Forestier, during the War, while

injecting certain solutions into the veins at the bend of the elbow, observed that these veins hardened. They began to study this phenomenon and noticed that the hardening was caused by the alkalinity of the solution employed, and they used this method for the obliteration of varices of the lower extremities, using sodium carbonate, but abandoned it on account of its extreme causticity. They further experimented and employed sodium salicylate. In England quinine and urethane preparations are used, and Noble uses an invert sugar solution. Each preparation has its advocates.

Fig. 1. Case 1. Before treatment. B. K., male, aged thirty-five, operated on twice for varicose veins with recurrences. Received 4 injections of 6 c.c. of sodium chloride with obliteration of veins. See Figure 2.

In our series of cases we have employed exclusively either sodium chloride 20 per cent, or sodium salicylate 30 per cent. Occasionally we have encountered cases that did not respond to the ordinary solution and have been obliged to use a stronger one. The theory of this treatment is based upon the action of the sclerosing solution upon the vein wall producing an aseptic phlebitis or venitis, and eventually obliterating the vein.

In giving this treatment one should be absolutely certain that the needle is in the lumen of the vein. The entrance of the solution around the veins into the surrounding tissues will most assuredly produce a very painful, slowly healing slough, which is not only disturbing to the patient but discouraging to the doctor.

The amount of solution employed varies from 1 to 10 c.c., depending upon the size and extent of vein injected. No definite law can be proclaimed as to this. Experience and careful study of each case will help one to determine the amount to be employed. One can use a greater amount of the chloride than of the salicylate solution.

At the time of the injection the patient will experience no pain, provided the needle is within the lumen of the vein. Following the injection, however, he will suffer a cramplike pain which radiates

down to the toes. The salicylates produce severer cramps. We have noticed that the longer the cramp lasts, the better the

Fig. 2. Case 1. After treatment.

results; generally the cramp lasts from fifteen seconds to two minutes. Note that we use the word cramp and not pain. Pain usually signifies either a leakage of the solution from the veins or the extension of the injection outside the veins. If this happens, the pain will increase in severity from hour to hour and day to day, and it may last for quite a time, from several days to several weeks, depending upon the extent of the slough it will produce. We use no tourniquet, because, not only does it produce pain, but it also produces stasis in the vein, diluting the solution employed with less chance for its action upon the intimal lining of the vein. The needle should not be withdrawn until pressure is exerted over the site of injection by means of a gauze pledget. Care should be taken that there is no leakage from the needle puncture, otherwise a painful bleb will develop. The patient should not be discharged therefore until the dressing has been inspected and found to be absolutely dry.

Following the injection one can observe the contraction and hardening of the vein. If the vein is tortuous, it begins to straighten out; it seems that this is due to the stimulation of the vasoconstrictors in the vein walls. The extent of the hardening varies with the amount of solution used and the dilatation of the veins. It is generally from 2 to 4 in., and always below the site of injection, proving that the solution does not enter the general circulation, but tends to descend towards the periphery. This is due to the high specific gravity of the solution employed and to the poor circulation in these veins. The dressing may be removed the next day or within forty-eight hours. Generally during that period the vein is noted to be hardened and the skin has a slight copper color and may be tender to touch. This is the so-called chemical venitis of Sicard. In a great number of cases the tissues surrounding the veins will become indurated, the so-called perivenitis. Sicard claims that the greater the perivenitis, the better the results are, and we firmly agree with his conclusion. At the end of two or three days, if the reaction is not severe, and in the absence of a slough, another area may be injected. We inject one segment at a time, because there is less likelihood of disability if one injection is given at a time. If the reaction is severe, the second injection may be delayed for a few days. The number of injections required depends upon the extent of the involved veins and upon the individual response; not all individuals respond alike. We found that tall, thin individuals, young individuals and men respond most rapidly to this treatment. The hardening produced in the vein disappears by absorption within one to six months. The longer the time required for its disappearance the better the results.

TECHNIQUE

In treating veins below the knee, except those of the calf, the patient may be seated

with the legs in a dependent position. The veins of the calf and those of the thighs are best treated in a standing or lying position. The preparation of the skin is very important. We use a 50 per cent solution of alcohol to clean the skin. Iodine has its objections, as it obscures the veins, making the injections more difficult. The needle and syringe should be made absolutely sterile despite the fact that the solutions are supposed to be self-sterilizing. One should use a sterile solution. A 20 to 22 gauge sharp needle should be used, for if the needle is dull and one must use force in inserting it, one may penetrate the posterior wall of the vein and cause a dangerous leakage. Again, no solution should escape from the needle before entering the vein. The point of entrance into the skin should be directly over that of the vein, so that if any leakage is to occur, it may have a direct line of exit. The valve action obtained by drawing the skin away from the site of entrance into the vein is not advisable, as the danger of a slough is greater. One should not attempt to inject the solution until he sees a strong flow of blood into the syringe.

Certain sites should be avoided, such as veins directly over the tibial bones; also over joints, and over the tendon Achilles because if we are unfortunate in getting a slough, the damage done may be very great.

EFFECT OF THE SOLUTIONS

Sicard, Forestier and Meisin, in careful studies of the veins of animals injected by these solutions, have noticed that the liquids have no coagulative action on the blood.

The action of the solutions may be described as follows:

1. Simple thickening of the vein wall; what we would call a vulcanization process in the wall. In such cases the lumen of the vein is not obliterated. This is most frequently seen in the very large veins of the thigh, but if one injects the same area several times, the vein is obliterated, and in such cases stronger solutions may be necessary (Fig. 4, Case 11).

2. Sclerosing and hardening of the vein;

Fig. 3. Case 11. Before treatment.

the vein hardens and the lumen is obliterated. This is observed most frequently when using the salicylate preparation.

3. Obliteration and induration of surrounding tissues, so-called perivenitis, is most frequently observed in thin-walled veins, and with the use of the chloride solution. These cases give the best results.

The microscopic changes observed in the veins are cloudy swelling and destruction of the endothelial intimal lining. These produce an abundant exudate of red and white cells with a proliferation of fibrinous tissue deposited upon the vein wall, which immediately begins to organize into a very firm mass. The vein is felt as a firm cord, and is easily palpated by the finger. We have found that the salicylates produce this reaction much more rapidly than the chlorides.

In ulcer cases the procedure depends upon the condition of the ulcer and the surrounding tissues. If the ulcer is badly infected it is best to put the patient at rest and apply wet dressings for a short

time until the ulcer looks cleaner. Generally such an ulcer is surrounded by thrombosed veins, but this does not constitute a contraindication for the treatment. We select the vein which feeds the ulcer directly; such veins are generally found above or below the ulcerated area. The amount of solution employed in ulcerated cases is less than in clean cases, as the reaction is much more severe than in ordinary cases, evidently due to the infected area surrounding the ulcer. This however is not alarming, but it may be necessary to delay the second injection for a week or so. Very distinct local changes will be noted in the ulcer following the injection. Within a few minutes oozing of serum will be observed from the ulcer base. An ulcer which has not healed for months or years will begin to show evidence of healing within two days. The scar of the healed ulcer is very hard and indurated, showing less tendency to break easily. In ordinary cases, at the time of treatment, we do not use any supporting bandages. In ulcer cases it is advisable to use, both at the time of treatment and after treatment, a supporting bandage. McPheeters, who has an extensive experience in the treatment of ulcers by this method, also advises the same procedure.

Fig. 4. Case 11. After treatment. S. D., female, aged sixty-four. Very large varicose veins, also eczema around internal malleolus of right leg for about nineteen years. Relieved of all symptoms and ulcer healed after 4 injections. No response to 20 per cent sodium chloride solution, but good response to 30 per cent. Though lumen of veins above knee not obliterated, patient is so well satisfied that, on account of her age, no further treatment given.

In eczemas, especially the weeping kind, the improvement is also very rapid. The itching and the discharge become less and in a short time disappear altogether. These patients are the most grateful of all.

If the patient's general condition is good and no contraindications exist, they may be treated by this method. Our oldest patient was a woman seventy-one years of age. Injection should be avoided during

menstruation as it seems that the reaction is then more severe.

ADVANTAGES OF THIS TREATMENT

The writers agree with McPheeters, Sicard, Noble and Linser, that this is the best treatment for varicose veins and ulcers. An advantage from an economic point of view is that patients are not prevented from following their daily labors. There is practically no danger of emboli. The danger of anesthesia and the discomfort associated with it in operative cases are avoided here. Further, operations leave disfiguring scars, and this prevents a great number of women from submitting to them; while in this treatment there is no disfigurement whatsoever. Whereas postoperative recurrences are common, by this method of treatment no recurrences have been reported. Indeed, it seems that these patients improve with age.

COMPLICATIONS

Although emboli have been reported, we had none in our series of cases. The only unpleasant complications we had were sloughs; but with improvement of our technique and proper precautions, they should not occur. Occasionally, with the best of technique they will occur, especially in cases where the vein wall is very thin. A slough is characterized by a blanched cyanotic area, with considerable inflammation and induration of the surrounding tissues. It is very painful, the skin always becomes black and gangrenous, and after a while, it shows evidence of separation from the surrounding tissues. Sicard, Linser and McPheeters advise the injection of normal salt solution into the area where a slough is suspected, claiming that this will dilute the solution and may prevent the formation of a slough, or lessen its extent. We have had no experience with this procedure. After the slough is formed, McPheeters advises complete excision of the slough area and suturing of the margins of the wound. We do not agree with him on this point. We believe it is best to wait until the slough separates and keep the edges of the wound strapped.

The writers had no emboli in their series of cases. These generally occur within a week or even later after the injection. In operative cases, according to American authorities, emboli occurred in 7 per cent. According to the German authorities it is over 1 per cent. In a careful study of the subject of emboli and mortality by McPheeters and Rice, using this form of treatment, in over 53,000 cases they were able to find only 7 cases of death; 4, or about .0024 per cent, were from emboli. These cases have occurred mainly in those patients who had a recent phlebitis or where coagulating solutions were used.

CONTRAINDICATIONS

1. Diabetes. In such cases the reaction is more severe and the danger of slough is greater, although Sicard does not consider diabetes a contraindication.

2. Pregnancy and Pelvic Tumors. In these cases the treatment should not be undertaken until several months after labor, or after the operation for the tumors.

3. Acute inflammatory condition of the pelvic organs.

4. Acute or sub-acute phlebitis should not be treated by this method until all evidence of inflammation has subsided, as these cases are very dangerous and are the most frequent cause of emboli.

5. Arterial Circulatory Disturbances of the Lower Extremities in Men. No man should be injected until one is absolutely positive that the pulses in both feet are present and normal.

6. Severe Organic Diseases, such as Pathological Heart and Kidney Conditions. These cases are best treated conservatively.

CHOICE OF SOLUTION

We have had no experience with quinine, mercury or glucose. Our experience has been mainly with salt or salicylates. Our preference is for the salt. The advantages of the salt are: First, it does not produce such severe cramps as the salicylates;

second, it is not toxic. The only disadvantage is that if injection has extended outside the vein, the slough produced is much severer and larger than that produced by salicylates. The salicylates sometimes produce poisoning in individuals who have an idiosyncrasy. This is manifested by dizziness, scaly eruption on the body, and even vomiting. We had 2 patients who vomited for twenty-four hours. Again, the cramp-like pain produced after the injection is sometimes excruciating. All these symptoms will disappear with the discontinuation of the salicylates.

Occasionally one will find individuals with very large veins who do not respond to a 20 per cent chloride or a 30 per cent salicylate solution. Such cases will respond very well to a 30 per cent chloride or a 40 per cent salicylate solution, as in Case 11.

CONCLUSIONS

We believe the injection treatment to be the best procedure in cases of varices and ulcers for the following reasons:

1. It is the safest treatment: There is no danger of emboli and anesthesia.
2. There is no disfiguration.
3. Economically there is no loss of time and earning capacity.
4. The results are permanent.

We quote McPheeters in his conclusion: "The injection treatment of varicose veins has passed the experimental stage and has proved to be a very rational form of treatment which should be accepted as supplanting other well recognized methods of therapy."

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THE APPLICATION & REMOVAL OF PLASTER-OF-PARIS BANDAGES*

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FULLY cognizant of and accepting much of the advance made in the treatment of fractures by traction methods with the limbs in suspension, I submit that there is none the less a large field of usefulness for the plaster-of-Paris bandage in the efficient treatment of a number of fractures, to attain which a precise technique is of the utmost importance.

I have repeatedly been called by physicians to counsel them as to why the plaster-of-Paris apparatus applied did not function. Most of these casts were badly made, brittle in places, messy looking rather than neat, *eye sores*, obscuring instead of aiding in the correction of the deformity, being either too tight or too loosely applied, *trouble makers*, creating much of the misery they should have relieved. These pitfalls can be avoided by observance of the directions about to be set forth.

MAKING OF THE PLASTER-OF-PARIS BANDAGE

You cannot put on a proper plaster-of-Paris bandage if you depend on the variety sold in the shops. Only the home-made hand-made bandage will yield the best results; therefore "Roll your own" materials. The plaster-of-Paris should be of the superior quick setting quality used by dentists, and packed in tin cans to guard against absorption of water (hydration). It should be stored in a dry place until used. Furthermore the hand or receptacle introduced into the plaster should be absolutely dry. Gritty particles in the plaster disclose that hydration has taken place.

Crinoline or tarlatan 28 × 32 mesh is the fabric into whose meshes the plaster is rubbed by hand. The crinoline is cut into strips of the widths desired and loosely rolled in 10-yard lengths; ¼ of a yard at a time is unrolled and plaster rubbed into the meshes of the gauze; and as each length is so treated, it is rerolled loosely. This arrangement permits the rapid and uniform spread of the water to all parts of the bandage when immersed for usage.

The completed bandages should be placed on end in the can or in individual containers. Additional protection from moisture may be had by wrapping each bandage in tissue paper, newspaper or waxed paper and finally sealing the can with adhesive tape.

IMMEDIATE PREPARATIONS FOR APPLYING THE PLASTER-OF-PARIS BANDAGE

The surgeon and his assistants should wear sleeved gowns extending the length of the body to protect soiling of the clothing. In like manner the floor covering, the patient's body and the couch or table should be protected against scattered plaster. It should be borne in mind that if a properly made bandage (home-made) is used, which need be but slightly compressed to rid it of superfluous water, no drippings will be scattered and the whole procedure will be attended with no soiling.

The number of bandages intended for use should be removed from the container and stood on end within 1 ft. of the vessel in which they are to be singly immersed. Such arrangement guards against spattering and rendering the bandages unfit for further use. Place the bandage end-wise in hot, *not cold* water sufficient to submerge it well and allow it to remain unmanipu-

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lated until the bubbles cease coming off. Then remove the bandage, squeezing it slightly but a single time to rid it of excess of water. To hasten the setting of the bandage some recommend the addition of salt or alum to the hot water. This accelerating of the setting is not of advantage inasmuch as the bandage is prone to set in the hand before it is unrolled onto the limb. With the home-made bandage prepared as previously described with the quick setting plaster the addition of chemicals is superfluous.

PROTECTION OF THE SKIN AND SOFT PARTS

This protection may be accomplished with a choice of materials. The area to be invested may be wrapped in cotton wool (sheet wadding) or a flannel bandage or an elastic (Ace) bandage. Any of these must however be applied without wrinkles lest they exert pressure under the plaster. An elegant investment of the skin is afforded by tubular stockinette (tricot hose) to be had in desired length and width from supply houses. Failing such, a stocking or glove or a sleeve or leg of underwear may be used. When the plaster-of-Paris bandage is applied to serve as the mould the limb need only be anointed with vaseline. In addition to this investment all bony prominences should be protected against pressure by a supplementary padding of cotton or felt. The plaster-of-Paris bandage should be wrapped, not pulled, about the limb and free from any reverses in the first layer where they might exert pressure. On the outer turns reverses can be employed, to add strength to the bandage; as each successive turn of the bandage is made it may be smoothed by stroking of the hand moistened occasionally with water. Do not at any time add any loose plaster or paste from the vessel, as such excess plaster adds to the weight when lying between the layer, not having been incorporated with the meshes, and when applied to the outermost layer as a smooth top dressing particles will become detached, find their way beneath the bandage and soil the clothing and floor coverings.

Where a tubular tricot hose is used, it should be twice the length of the limb so that the extra length can be drawn over the completed cast until the two edges meet, when they are sewn together. The upper and lower ends of the plaster bandage itself must not extend beyond the underlying investing material.

A smooth finish may be given to the ends by turning the ends of the underlying bandage over the plaster-of-Paris bandage; or a cuff effect is obtained by securing a cuff of cotton by a turn of plaster bandage at each end. This refinement prevents the rough ends of the plaster from scratching the skin. When the flexure of a joint (knee or web of a thumb) is encroached upon by the limits of the plaster a crescentic section may have to be removed sufficiently to eliminate the interference with motion. Such section should be done with a sharp penknife or discarded scalpel while the bandage is still plastic.

Again, with the bandage in the plastic state, it can be made to conform to the contours by pressure and massage-like motions, far better than by traction on the bandage. No undue traction should be made in applying the successive turns of the bandage. The use of any other than a light hand, when unrolling the bandage onto the member will be followed by such constriction of the limb as will necessitate prompt and immediate removal of the bandage. It is most important to exercise every precaution to place a plaster-of-Paris bandage correctly in the first instance, for its immediate removal because of faulty and inadequate application is a painful procedure, and such uncalled-for and unnecessary experiences have brought the usage of these bandages into bad repute. A committee of the American Surgical Association on fractures says, "A circular plaster-of-Paris dressing is permissible when completely divided in at least one line." Such a division can be effected immediately, the bandage being

in a plastic state, by running a sharp pruning knife along the prominent part of the bandage; or if the division is left to a later moment the splitting may be done with properly constructed plaster shears (Stille's shears); or failing to have such, a few drops of acetic acid or a 50 per cent citrate soda solution will soften the plaster and permit the quick and easy cutting of a groove. Some deem it expedient to place a strip of zinc ½ in. wide or a wire next to the limb before starting the plaster bandage and to allow the ends of the metal to protrude as a guide in starting to cut the groove so as to have the knife strike the metal and avoid injury to the soft parts beneath.

In the treatment of Pott's fracture plaster-of-Paris finds its widest application and I therefore chose to feature its application thereto as a type upon which all other applications of plaster-of-Paris for fractures may be modeled.

APPLICATION OF A PLASTER CAST FOR POTT'S FRACTURE

Such a cast must extend from the toes to the knee joint embracing the condyles and not going merely half way up to the calf and so cutting into the flesh at that improper level. (Four to six bandages may be required, depending on the proportions of the limb.) With this in mind the limb is invested with tricot stockinette or flannel bandage from the condyles of the tibia downwards including the foot to the webs of the toes. Reduction of the fracture is more frequently under an anesthetic either manually or by mecanical device (Hawley table). The foot must be brought from equinus posture to that of a right angle and varus to offset the valgus position. Thus corrected or even overcorrected the boot should be held by assistants as follows:

The heel is supported in the grasp of the index finger and thumb of the left hand of the assistant whereas with the right hand pressure is exerted upwards on the foot by the right thumb pressing on the ball of the toe forcing the foot into the right-angle position. If now the knee be flexed to a right angle and steadied by another assistant, stationed at the head of the table grasping the calf at the same time, the tendo Achilles will be relaxed and the equinus give way to a right-angle position. When there is no assistant to hold the foot, a sling of muslin is passed about the arch or even tied to the big toe and either end held taut by the patient if he be conscious; or the ends of the bandage are fastened to the upper ends of the table. The sling about the arch may be enveloped in the turns of the plaster and the protruding ends cut after setting has taken place. Extra padding of felt or compresses of cotton batting should be applied to the malleoli, a strip of cotton along the crest of the tibia, a cuff about the condyles of the tibia and also a pad over the dorsum of the foot and finally sufficient padding to maintain and if necessary restore the normal hollow of the arch. Flat-foot (valgus) is very prone to follow Pott's fracture, to obviate which the foot should be well inverted (varus) and be kept in a right-angle position.

The upper limit of the cast anteriorly must hug the condyles but posteriorly that level has to be reduced by cutting away a crescentic strip sufficiently to permit flexion to a right angle. Below the plaster bandage should extend to the webs of the toes subsequently easing up the points of pressure by splitting the bandage along the fibular and tibial borders, but under no conditions attempting the same easement by cutting away a portion of the bandage in a circular direction.

Some surgeons would have the upper limit of the cast at the condyles, others would include the knee joint. The choice may be set down as follows: Where the fracture is limited to the ankle joint a cast extending to the condyles is sufficient, whereas fractures above the middle of the leg call for the immobilization of the knee also, and under these latter circumstances

the cast should be carried up to the gluteal fold posteriorly and Poupart's anteriorly.

The bandage should remain on two weeks before removal. The splint may then be sprung apart and attention given to the toilet of the soft parts. Following massage and slight active and passive motions in recumbency it is replaced and the gaping edges approximated by strips of adhesive plaster. Daily removal may then be undertaken for another period of two weeks after which, although the limb may not be in a weight-bearing condition, early restoration of ankle motions will be more likely to be obtained by discarding the rigid plaster dressing.

A lingering mistrust of the use of the plaster-of-Paris bandage is based on the dangers of gangrene and ischemic paralysis setting in because of the popular fallacy, "the immediate use of the plaster-of-Paris bandage at a time when there is much swelling." Immediate use does not imply instant use. It should be borne in mind that usually several hours elapse before all conditions are met for applying the bandage. Hence there need be no dread of still further increase of the swelling under the bandage. Indeed the best means of combating the swelling is complete prompt immobilization. The first step towards this is expressed by the slogan "Splint 'em where they lie;" then comes elevation of the limb to be followed up by gentle massage and the use of a compressing bandage for a few moments before placing the cast.

If after all the aforesaid precautions there still are pressure signs such as increasing redness with throbbing and pain or on the other hand coldness of the limb or livid color of the toes and numbness, then extreme elevation of the limb with administration of an opiate to insure absolute rest may dispel all these in the course of an hour; if contrariwise, the *cast must come off*.

The American College of Surgeons has included the plaster-of-Paris bandage among the essentials for an efficiently equipped fracture service.

Because of the splendid response to its previous exhibits the Fracture Committee of the American Medical Association has been requested to demonstrate for a third time, at the forthcoming meeting at Portland, Oregon, the "Making, storing, and use of the plaster-of-Paris Bandage" as an essential of its program.

Evidently the plaster cast has not lost caste.

SUMMARY

The "high spots" in the effective and efficient use of the plaster cast may thus be summarized:

1. "Splint 'em where they lie."
2. "X-ray 'em."
3. Elevation and massage with compression.
4. Anesthesia for reduction and during application.
5. Use only home-made bandage; roll your own bandage.

GANGRENE OF THE FOOT*

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TO find a satisfactory basis for the treatment of foot gangrene it becomes necessary to analyze the various groups coming under this heading.

We can distinguish, in the main, three groups.

1. Trophic ulcers (the true Raynaud and ulcers following nerve affections).
2. Arteriosclerotic gangrene.
3. Thromboangiitis obliterans.

As far as the first type is concerned we must realize that local treatments of any kind will show very little influence on the process. Unless we can take care of the underlying cause, and in many instances we do not know it, we only can protect the ulcer but not hasten the healing.

The difference between the second and third groups lies in the fact that in the arteriosclerotic form the inflammatory reaction is secondary, due to an infection, while in the third type an inflammatory process of unknown origin exists.

For this reason we find in the thromboangiitis obliterans, a phlebitis, (phlebitis migrans) and very frequently signs of an inflammatory process with swelling, redness and pain.

The most satisfactory results are obtained by intravenous injections of a 5 per cent saline solution. Though not all cases respond favorably, I have seen the most astounding recoveries in the clinic of Dr. Silbert following this treatment.

In many cases, such as old age, this method cannot be used and in these cases physical therapy is called upon to obtain a cure.

Most people are using heat in various forms, but the object of treatment is not, as commonly thought, to increase the arterial circulation but to improve the local circulation.

This is by no means a sophism. In many cases the circulation is not so bad on account of deficiency of the arterial blood supply, but in consequence of an inflammatory process the venous and lymph circulation is interfered with and the nourishment of the tissue becomes deficient.

If we, as is generally done, institute heat therapy, be it diathermy or hot air treatment, the arterial blood supply will increase and, on account of the insufficient outflow, the local stasis will increase and the condition of the affected part will become more aggravated. A number of times I had very unfortunate experiences, whenever a local cyanosis existed. The ulcer and the infection spread rapidly and the patient died in spite of an operation. I consider heat treatment contraindicated in all cases with cyanosis.

Following this trend of thought I tried to improve the local circulation by taking care of the edema. This can be done by gentle massage, peripheral from the ulcer, three to four times a day for about fifteen minutes.

In 2 cases in which I put this idea into execution I was able to obtain a very satisfactory result.

A man of about seventy years showed a gangrene of four toes on one foot and of three toes on the other. The toes were perfectly black, the entire foot very swollen. I gave instructions to massage the leg three to four times a day, and the ulcers healed after two months.

Another patient, a man of eighty-four years, likewise showed a marked improvement, but a few months later he died from a heart attack while sleeping.

I should strongly object if one would impute to me the idea that massage can

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cure an arteriosclerotic ulcer. It does not, but massage improves the local circulation in cases with marked edema and with the improvement of the circulation the ulcer heals.

This experience illustrates well the principle which should guide every effort to use physical therapy. The question is what kind of assistance the organism needs. Which one of the modalities is best suited to supply these needs is another question.

The problem is different if the local condition indicates that the arterial circulation alone is at fault; then heat treatments are in order. In some cases diathermy should be the method of treatment; in others preferable treatments are conductive heat, hot air, infra-red rays or white light.

Diathermy is best applied in the following way: Two glass basins are filled with 15 per cent salt solution and a plate electrode, connected with one pole each, placed on the bottom. This electrode is covered with a towel and one foot put on each. The current then goes through one leg into the other. The advantage of this method is that a burn is impossible.

In another method a cuff electrode is tied under each knee, padded with a towel soaked in salt solution. The feet can then be placed in one basin in the same way. If one desires to treat only one foot the same method can be used by preparing only one leg. If both feet are treated at the same time the cuff electrodes are connected with one pole by means of a split connector.

The strength of the current is about 600 to 700 ma. for half an hour. The number of treatments a week depend on the reaction of the patient. It is not always advisable to force the treatment.

In case one uses conductive heat good care must be taken to protect the toes. The temperature used in these methods is very high, sometimes 280°F to 300°F. It is obvious that the tissue cannot stand this amount of heat unless it is cooled by the circulating blood. In these cases the circulation is very poor and the cooling of the tissue insufficient, so that severe burns may result.

Generally the order is given to take the treatment three times a week. This prescription is illogical. If we want to improve the circulation by dilating the arteries, and it has been said that this is not always desirable, we must give long and frequent treatments.

This point of view is particularly important if we want to find a solution in a very vexed problem.

It is well known that in most cases operated on for gangrene of the foot, even when amputation is made above the knee, the healing of the wound is very slow, the sutures do not hold and new ulcers appear which heal very slowly, if at all. Generally heat treatment is resorted to after the ulcer appears. This is a very inefficient method for handling such cases. To get a primary union we need very good circulation. In fact the circulation cannot be too good. It is, therefore, advisable to start the heat treatment before the ulcer appears and if possible immediately after the operation.

In one of my cases, operated on by Dr. H. Lilienthal, heat was applied from the time the patient was brought down from the operating room. A lamp was placed over the dressed wound. The patient left the hospital eleven days later with a perfectly healed wound.

In conclusion I may say that the object of treatment is to improve the circulation and that the method to be used must be selected accordingly. The end-results in most cases are not very good. In fact, treatments improperly pushed may even aggravate the condition. I saw a case in which amputation seemed to be the only recourse improved by Christian Science. This simply shows that some cases may be better off by being left alone.

CARTILAGE INJURIES*

A CLINICAL STUDY

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IN a previous article upon this subject, the fingers, wrist and elbow have been dealt with. We now extend the study to the area about the shoulder, including the associated bursae and acromioclavicular joints.

THE SHOULDER

Although the shoulder is the most frequently dislocated articulation, it seems to me we give little or no attention to the various cartilaginous structures in our consideration of such an injury. Perhaps this is because of the ease with which a reduction is usually accomplished. The end results are, as far as we know, excellent, and therefore we dismiss from our minds any further thought of the associated lesions. Even the frequently accompanying fracture of the humeral tuberosity gives us little concern, since this is usually of the non-displaced (Type 2) variety, and the entire condition is thus looked upon as being only slightly more than a minor accident.

Before beginning a discussion of the more severe shoulder injuries, it is well to note that without a dislocation or neighboring fracture (which does not involve the articulation itself) a non-infectious synovitis of this well-protected joint may occur. We rarely hear of this diagnosis except when the knee is concerned.

Arthritis of the shoulder is often mentioned, but the exact nature of this arthritis, in the case of the shoulder, is likely to be omitted. As I stated in writing of elbow injuries, *traumatic arthritis* is a real pathological entity, and the presence within the shoulder is not uncommon.

No attempt will be made here to classify shoulder dislocations, nor will any of the methods of reduction be discussed. The object of this paper is to stimulate an interest in the part played by the cartilaginous tissues, in order that a more accurate diagnosis may be made in many obscure and obstinate shoulder conditions.

In every dislocation, of course, there must be an injury to both the synovial membrane and the articular hyaline cartilage. Undoubtedly, the intra-articular fibrocartilage is also damaged. This has been noted by a number of writers. Broca and Hartman have found "half of the fibrocartilage torn loose from its attachment."[2] Speed has observed "a splitting of the cartilaginous run," with "small fragments of bone within the joints."[3] Others have described an "indentation or shipping of the humeral head." Many months following a so-called simple dislocation, during a clinical examination, I have frequently noted a vague sense of joint crepitus. This is often felt by the patient, and I have known of instances where these symptoms served as an excellent excuse for malingering.*

It is my opinion that the looseness of the articulation explains why a cartilaginous displacement of the shoulder does not produce the severe symptoms found in a similar derangement in the knee. If at every opportunity offered to inspect the cartilage of the shoulder, careful observa-

* A nice method to detect malingering in the case of a failure of the patient to raise the arms above the head is to have him stoop forward with the palms of the hands resting upon a table. Then ask him to slowly step backward; encourage him to step way back. The arms are now held in the position they have reached by the examining surgeon, and the patient told to stand erect. As he does so, the arms will be found far above the head, and he is forced to admit they can be placed in this position.

* Submitted for publication January 15, 1929.

tions were made, soon we might be in a position to make a positive diagnosis and institute proper methods of treatment.

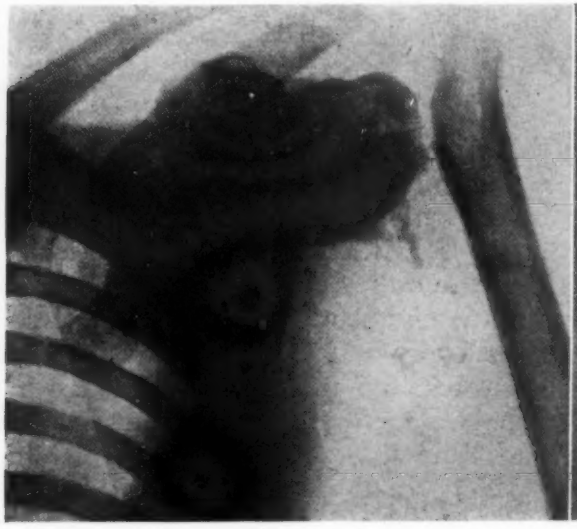

Fig. 1.

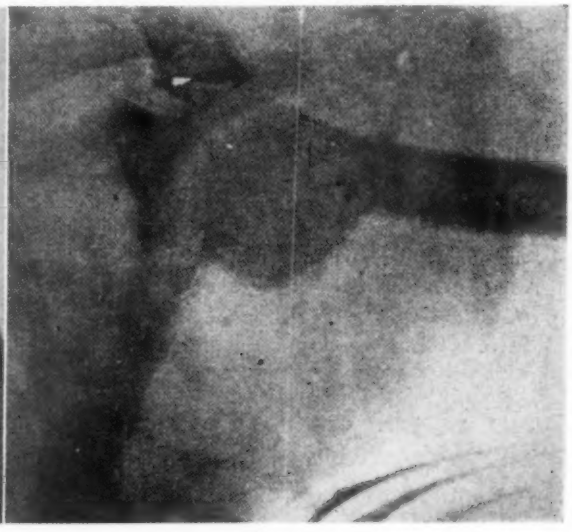

Fig. 2.

The usual indications for opening the joint are as follows:

1. Fracture dislocation of the head of the humerus.

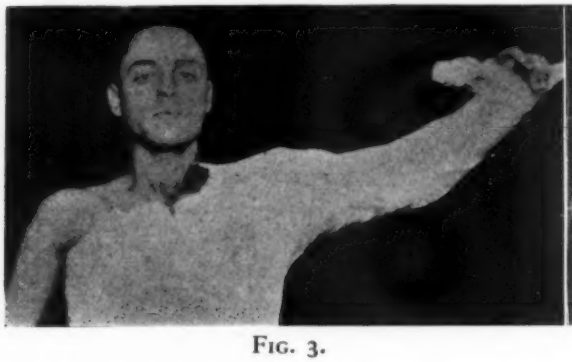

Fig. 3.

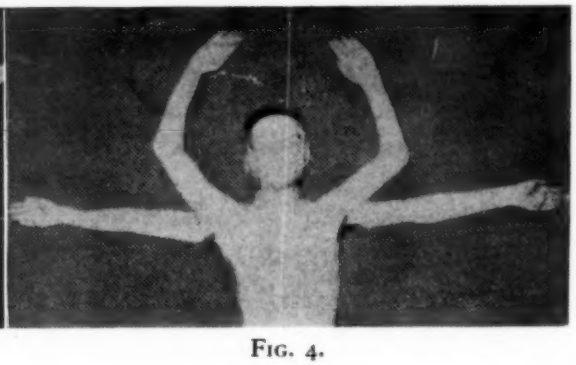

Fig. 4.

2. Irreducible dislocation.

3. Repeated dislocation (with subluxation).

4. Disease of the head, requiring its removal.

To this list we may, after sufficient study, be in a position to add a fifth operative indication:

5. Loose bodies within the joint.

1. *Fracture-dislocation.* This condition demands an immediate operation and certainly involves the intra-articular as well as the articular cartilage. It may be well to include here a lengthy case report which was also presented in a previous article by me on this subject.[4] This case report will serve to describe what I consider the most favorable method of opening the shoulder with the least amount of damage to muscles, nerves and blood vessels about this region.

Case 1. W. H., a truck driver, aged twenty-eight, fell about 20 feet into an elevator shaft December 8, 1923, and struck directly on the left shoulder, also fracturing the right forearm. He was operated on the following day. An 8-inch incision was made along the anterior margin of the deltoid muscle, a few fibers of which were separated but not cut. The tendon of the biceps muscle was found lying between the fragments. The head was completely dislocated below and anterior to the glenoid

cavity. There was a rent in the joint capsule on the upper posterior surface and the entire joint was filled with blood.

patient given a sling. Physical therapy was continued, and active motion encouraged by having the patient climb with his hand up the

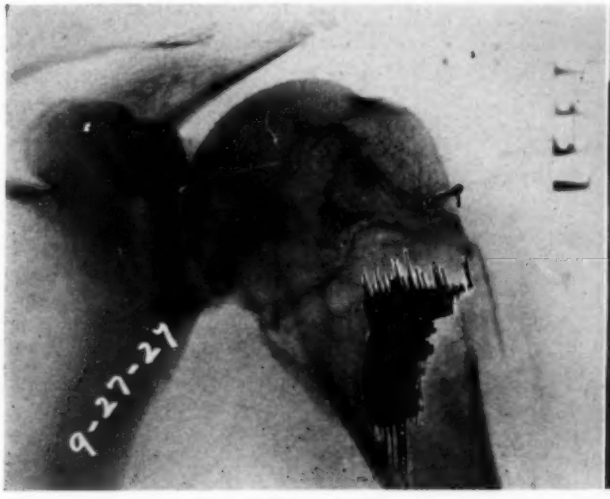

Fig. 5.

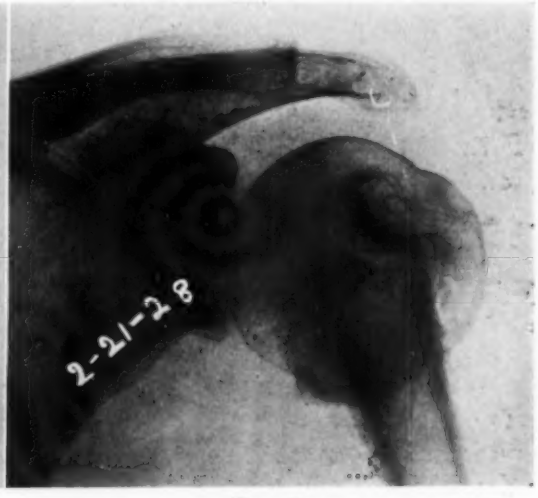

Fig. 6.

An attempt was made to reduce the dislocated head by pressure and by traction, but this was impossible. The joint was then opened on the anterior surface by an incision ½ inch in length and with a blunt curved periosteal elevator the torn fragments of the capsule and cartilage were pushed away. Using this instrument as a pry, with the end placed against the margin of the glenoid cavity, the head was rotated half a turn on the instrument, and easily snapped back into place. The opening was then closed and a reef taken in the capsule, so as to make the relaxed anterior portion very taut.

Some loose fragments of bone were removed and holes drilled through the head and through the shaft, which had ridden upward past the glenoid cavity and nearly pierced the skin above the shoulder joint (Fig. 1). The shaft was pulled downward and the fragments sutured with heavy kangaroo tendon. The biceps tendon was placed above the suture line and the wound closed in the usual manner.

A few days after the operation, the upper portion of the cast was removed from the forearm and motion in the hand and wrist begun, and on December 30 the entire cast was removed, the patient being placed in a "traction suspension" apparatus, thus allowing motion of the elbow and shoulder and the beginning of physical therapy.

January 10, one month following the operation, all appliances were removed and the

standard of an irrigation stand, marks being made to denote each day's progress in voluntary abduction. I believe this to be better than climbing up a wall, as this permits the patient to grip his hands about the standard and encourages more extensive movements.

The end-results were excellent. Rotation was very little impaired, and full abduction was slightly limited. He has since returned to work as a truck driver.

2. *Irreducible Dislocation.* Here it is well to attempt a closed procedure, even as late as four months following the injury. Kocher considers a dislocation to be irreducible after the head has remained out of the glenoid cavity for from five to seven weeks. In attempting repeated forceful manipulations, one should not forget that numbers of cases have been reported where there was an injury to the axillary vessels or to the large nerve trunks about this area.*

* In this connection it seems well to stress the importance of the surgeon himself, at the time of his first visit, making at least a superficial inspection of the sensory and motor nerves supplying the upper extremity. It is to be recalled that in the region of the attachment of the deltoid there is on the lateral surface of the arm a small triangular area of skin which is supplied by the circumflex nerve. This may give a clue as to why there is a loss of the power of abduction, but in my experience a paralysis of this nerve is rarely seen associated with an injury which involves only the shoulder area.

Case II. J. C., a man aged seventy-three years, fell down an elevator shaft. Roentgenograms were made, showing a dislocation of the

Fig. 7.

left shoulder which was said to have been reduced and the shoulder placed in a plaster of paris cast. When the cast was to be removed, it was noticed the bone had "slipped out of place some time during the four weeks that the cast was worn." I saw the patient at this period. He was referred to the Post-Graduate Hospital, where under a single gas-oxygen anesthesia I made several unsuccessful attempts at reduction. An ulnar nerve lesion followed. He was placed in a traction-suspension appliance, but because of his mental state, he repeatedly removed, not only the weights, but also the entire dressings. For years he had suffered with a heart lesion, and an open reduction under a "brachial block" or under local anesthesia did not seem advisable. His family removed him from the hospital, and one month later he died from his cardiac condition.

I recall seeing Dr. J. J. Moorhead operate upon an irreducible dislocation when the head had been allowed to remain out of the glenoid for about two years.

Case III. T. O'C., a man aged fifty-two years, fell against a fly-wheel and dislocated his shoulder, two years prior to admission. The joint was filled with a huge amount of connective tissue which also seemed nearly to cover the articular cartilage of the humeral head. It was removed with great difficulty, and satisfactory reduction accomplished.

3. *Repeated Dislocation Due to Subluxation.* In certain cases this condition becomes a source of disability, and I have known it to be used as an excuse for malingering. Extensive operations have been described for deepening the shallow glenoid. These I have never attempted or seen performed. A simple reefing or plication of the capsule is often quite sufficient. To repeat what has already been said: at such an operation we should open the joint and observe the cartilage, a thing which often is not done. It has been very disappointing, in reviewing the operative records of such cases, to find frequently no mention whatsoever regarding the position, the fixation or appearance of the fibrocartilage or any of the various tissues within the capsular ligament. In cases where an absolute fixation of the joint is required or where there has been a destruction of the head and upper portion of the shaft of the humerus, I recall distinctly assisting at an interesting operation performed upon an army officer by Dr. Fred H. Albee. A bone graft was placed from the acromion process downward, and inlayed into the upper part of the remaining shaft, thus bridging over the area of bony loss and stabilizing the shoulder joint. Even with the shoulder fixed, it is surprising to note the amount of motion that can be obtained from the movements of the scapula.

4. *Resection of the Humeral Head for Disease.* The case about to be described may not seem to be closely related to the subject of cartilaginous injuries, in as much as the articular cartilage was not removed; still it will show what can be accomplished when the articular cartilage of the humeral head can be saved.

Case IV. B. S., aged seventeen years, a fur operator, while playing baseball slipped and fell on the extended left hand, causing a fracture of the surgical neck of the humerus (Fig. 5; this film unfortunately was scratched)

and osteitis fibrocystica in the region of the fracture. At operation the cortex of the bone in this area was found to be about as thick as an egg-shell, and the cryptic areas filled with organized blood clots, some as large as walnuts, could be seen through the thin bony shell. The entire area was dissected, and the remaining shaft forced into the small epiphyseal portion of undiseased bone (Fig. 6). Bony union was rapid. On November 28 a prophylactic dose of deep roentgen rays was given in order to destroy any cells which might well have been allowed to remain. There has been no sign of reoccurrence during the past one and one-half years. The boy has gained weight. There is scarcely any limitation of motion (Fig. 7) and he has been able to return to his usual occupation.

One cannot leave a discussion of the shoulder without saying—(1) that aspiration of the joint is rarely thought of, probably because of the surrounding structure; (2) that prolonged immobilization is often carried out with injurious effects; (3) that baking and massaging are done in a routine manner; and (4) that this articulation is frequently more blindly treated than any other commonly damaged joint.

SUBACROMIAL, SUBDELTOID, AND SUBCORACOID BURSITIS

In as much as these lesions are so closely associated with shoulder-joint injuries, a detailed description of them should be made in a study of cartilage injuries. The subacromial and subdeltoid bursae have been known to communicate, and may be dealt with conjointly. Their exact location is illustrated in Figures 8 and 9.

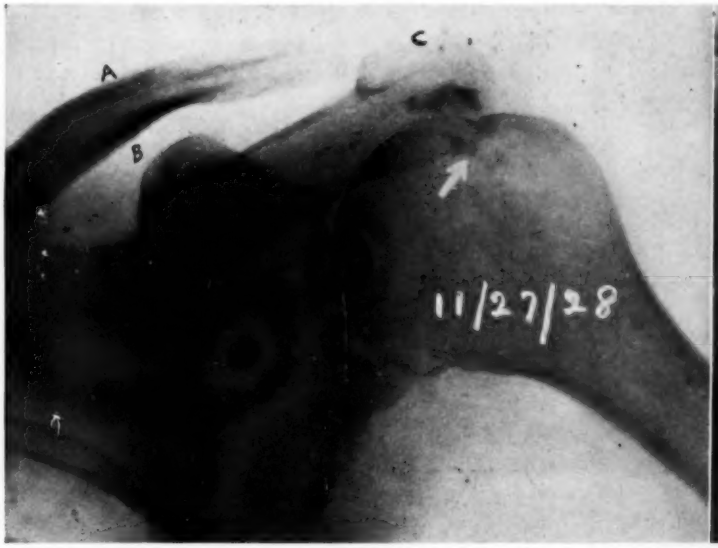

Fig. 8.

Fig. 9.

There may or may not be a history of trauma. The onset is often sudden and unexplainable, or it may be slow and gradual as in the case of frequent small traumae in connection with an unusual occupation. During one year I observed five barbers, each with a bursitis of the left shoulder (the comb being held upward while cutting hair). I was tempted to describe a "barber's disease" after the manner of "housemaid's knee," etc., but for the past two years I have not treated a barber for this condition.

There is frequently a total disability to abduct the arm, and one may even consider a paralysis of neural origin until such a lesion can be excluded. The pain is excruciating or may be noticed only at night (the patient cannot sleep on the affected side). The pain, although it varies, tends to radiate downward to the elbow, or even as far as the hand. On examination, no swelling can be noticed through the thick deltoid. There is a very definite point of tenderness, not over 1 or 2 cm. in diameter, located between the

tip of the acromion process and extending downward as if running along the bicipital groove. It is by this area of tenderness,

Fig. 10.

with the exclusion of other lesions, that one may arrive at a diagnosis; but without a positive roentgenogram showing a shadow of the bursa I have never been content with such a diagnosis.

Case v. C. G., a woman aged thirty-eight years, a dress-machine operator, said that in trying to open a large window, she "sprained her left arm." The following day the shoulder became extremely painful and "paralysed." Various lotions and ointments were applied without relief. There was a very small area of acute tenderness where the roentgenogram showed calcified deposits located within the subdeltoid bursa. The patient failed to return.

Case vi. J. L., a man aged forty years, a private secretary, suddenly, three weeks previous to admission, developed a pain in the left shoulder. He had no unusual occupation, or had he undertaken any excercises which could account for his shoulder condition. The only possible explanation he had to offer was that commuting to his suburban residence he usually sat with that shoulder near the window. The man came to me with a typewritten history he himself had made of his case. He had gone through various tests, and brought a complete set of roentgenograms of his teeth. There was a very small area of acute tenderness, such as already described, and on this point alone I made a diagnosis of subacromial bursitis which was confirmed by roentgenogram the following day. As Dr. W. H. Meyers of the New York Post-Graduate Hospital has had favorable results by treating these bursae with massive doses of roentgen rays, this was tried in November. One week following his treatment he was able to move the arm, and was entirely free from pain, except during extreme abduction.

Others have been treated with massage and baking, with excellent results, but the treatments are painful and the disability period extensive before a "cure" is effected. In obstinate cases a removal of the bursa is indicated. Dr. H. H. Ritter[5] has noted, after a careful complete removal, in two instances a recurrence of the symptoms. Later roentgenograms did not reveal any remaining deposits.

I personally have had no experience with subcoracoid bursitis, and quote from Goldthwait, Painter and Osgood:[6] "Subcoracoid bursitis may be caused by a faulty posture . . . The lesser tuberosity of the humerus rests against the tip of the coracoid process . . . Changes in attitude may cause a marked relief at once."

ACROMIOCLAVICULAR SEPARATION

The motion permitted at this point is of a gliding nature, on the part of the clavicle, while forward and backward rotation of the scapular is also possible but limited by the coracoclavicular ligaments. There is located within the joint a triangular fibrocartilage which is separated from the bones by a synovial joint cavity on one or both sides. That this fibrocartilage may become displaced has been frequently noted, as in the case reported by Speed where it was completely torn away from the end of the clavicle. The frequency of a separation of this joint may be judged from Kronlein's report of 400 dislocations, in which the acromial joint was involved in 11 cases, and the sternoclavicular in 6 instances. I myself have

seen only 5 cases of acromioclavicular separation, one of which came to operation. The pathology may be explained by a

Fig. 11.

direct violence to the shoulder, which forcibly separates, or by an indirect violence, such as explained by Wilson and Cochran,[7] where a forceful driving upward of the scapula, causes the coracoid process to come in contact with the clavicle, and thus pry apart the joint. (See Fig. 8. Patient struck point A, and if the arm is carried across the chest separation must occur at point C.)

Case VII. A young man, aged twenty-eight years, in wrestling received a direct blow to the anterior shoulder. There was a distinct depression over the articulation noticed on clinical examination, about 1½–2 cm. in length. It will be recalled that the normal anatomical separation of the joint is 1 cm., but this cannot be detected clinically. He worked as a drug clerk, and claimed that in reaching to remove even a light object from a high shelf, the sudden pain caused him to drop things. I operated upon him at the U. S. Marine Hospital, completely removing the intro-articular cartilage, and also the articular cartilage covering the bone ends, which were sutured together with kangaroo tendon. After four weeks there appeared to be a fibrous union. Thinking that such a union would be ideal, motion was begun. The case was seen nearly two years later. Although the symptoms were not so marked as to interfere with his work, he claimed that at times when reaching too high he still had a slight pain.

Case VIII. A. C., aged thirty-six years, a housewife, eight weeks previous to admission was hit by an automobile, and operated upon in

Fig. 12.

a neighboring hospital. Following the operation she came to our department for the first time, with an open wound. This was closed, and straps were applied to draw the joint together. Later she was given massage, and although persistent, the end result in function was considered good.

Case IX. E. S., aged fifty-five years, on July 16, 1927, was struck by a taxi. He came to the hospital two days later. Strapping was applied, which failed to correct the deformity, but after a period of time there was no remaining disability.

Case X. An army officer, about thirty years of age. In this case strapping was tried and later an abduction splint (which was worn much to the dislike of the patient). He was transferred from our hospital, and I was unable to follow the case to a conclusion.

It is my belief an early operation should be done in cases where great force is required, as in laborers, or in those whose unusual duties require reaching into abduction of more than a right angle, and that no wide range of motion should be attempted until firm bony union has occurred. I do not believe in any form of metal fixation. The only case I ever saw of a non-union of the clavicle was one in

which there had been an attempt to treat the condition by means of wiring.

STERNOCLAVICULAR DISLOCATION

I have seen a dislocation of the sternoclavicular joint on two occasions only. Although a fibrocartilage is interposed between the bones, reduction is usually easily accomplished. The difficulty is to maintain the reduction. One of the cases was in a young woman, where the deformity, and not the disability, was the cause of her seeking treatment. She was a housemaid, and the accident occurred in her attempting to shove a heavy basketful of fruit across the floor. Repeated adhesive strapping was tried, with little or no result. She refused operation for the fixation of the joint. Satisfactory results have been reported.

Recently Lowman[8] had described his operative technique for fixation of this joint, with a report of an excellent end result. It is to be remembered that a wide range of motion is permitted at this articulation. Personally, I have not had an opportunity of seeing the late end result following such an operation.

CONCLUSIONS

1. The shoulder joint demands more careful study.
2. Cartilaginous structures play an important rôle in all shoulder injuries.
3. Acromial bursitis is not a rare condition:
   a. Such a diagnosis must be confirmed by roentgen ray.
   b. Roentgen-ray treatments of this condition are indicated.
   c. Operation should rarely be resorted to.
4. Acromioclavicular separation, if disabling, should be operated upon.

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FRACTURES OF THE FINGERS*

E. L. ELIASON, M.D., F.A.C.S.

PHILADELPHIA

FRACTURES of all kinds are the pet aversion not only of the general practitioner but of many surgeons. The reasons for this are twofold. In the first place the average physician will not take the time to equip himself with a thorough knowledge of fractures nor will he exercise the patience and painstaking and time-consuming care that is necessary to a favorable result. Consequently the ultimate results in broken bones are not all that could be expected nor that we could desire. The same discontent is experienced by the patient and hence the frequency of suits for malpractice, which is the second reason for fracture patients being unpopular in the eyes of the physician. It is true that most of the suits are in the case of fractures of the larger long bones but the crippled fingers come in for their quota of dissatisfaction and law suits. A little more attention should therefore be directed to them. Although these fractures constitute only from 3 per cent to 4 per cent of all fractures, nevertheless they result often in deformity or dysfunction out of all porportion to the severity of the injury. Again the result in these infected compound fractures is all too frequently that of loss of the digit from necessary amputation.

In the consideration of these as well as other fractures a real knowledge of the applied anatomy is the first and most important feature. No one can understand why a typical deformity occurs or how to correct the same without this knowledge.

SURGICAL ANATOMY

Each digit has three phalanges. These include the thumb, for in development the proximal bone is a phalanx and not a metacarpal, by virtue of its epiphysis being at the base or proximal extremity as is the case in all other phalanges. The first and second rows of these bones have a concave surface on their palmar aspect to permit of grasping objects with security and comfort. The distal phalanx has straight lines on both aspects. These points should be borne in mind and taken advantage of in the treatment of certain fractures. The interphalangeal joints are constructed by a trochlear surface on the proximal and a shallow socket on the distal bone. These are held together by anterior and lateral ligaments, which probably accounts for the fact that sprain fractures occur more frequently on the anterior or palmar aspect except in the case of the distal phalanx. Dorsally the absent joint ligament is replaced by the extensor tendon which attaches only to the base of the distal and to the side of the middle phalanx. Here the bone fragment may be pulled close together with the avulsion of the tendon resulting in the so-called mallet finger on the palmar aspect. The head of the proximal bones forms the knuckle in flexion. The articulation is distal to this, the proximal one being ½ inch, the middle ¼ inch, the distal ⅛ inch distal to the knuckle prominence. The position of the palmar transverse furrows will indicate the articulation level. The first furrow is midway between the metacarpophalangeal joint and the articulation between the first and second phalanges; the two remaining furrows correspond to the position of the articular line.

ETIOLOGY

Direct violence is the usual cause of fracture in these bones. The automobile door is a frequent offender usually causing a crushed comminuted or "bursting" fracture of the distal end of the last phalanx.

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Indirect violence such as may occur from a blow on the tip of the finger may result in a dorsal sprain fracture or, rarely, an epiphyseal separation with diaphyseal fracture, causing a "dropped" finger tip with loss of extensor power. In the other two phalangeal rows, indirect violence usually results in a fracture at the base of the bone. In the proximal and middle phalanges direct violence against their distal extremities often results in fractures of a longitudinal or long oblique nature. Occasionally the articular surface, usually the distal one, is fractured.

FIG. 1. *A.* Comminuted "crush" fracture of distal phalanx resulting in disfiguring flattening of finger tip. *B.* Transverse fracture of distal phalanx, with but slight deformity.

The base of the proximal phalanx of the first digit (thumb) is usually fractured by violence applied laterally against the extremity of the bone. It occurs most frequently in the fistiana sport, and is the direct result of the "haymaker" or "side swipe" against a hard portion of the opponent's anatomy, most often the head. For this reason it is commonly spoken of as the "sparring fracture." It is also termed the stave or Bennett fracture.

Many of the fractures are compound due to the nature of the trauma and the subcutaneous situation dorsally. Crushed, industrial fractures are usually open and infected. Epiphyseal separations occur occasionally but only in patients under twenty years of age. Torsion is frequently the cause of such injury, especially in the thumb, the result of twisting by another child while at play. Baseball injuries are usually in the nature of a fracture subluxation. Fissured fractures, especially of the distal phalanx, are not unusual. Except for crush fractures due to direct violence the proximal phalanx is the most frequently broken. Fractures of the digital tuft are often compound.

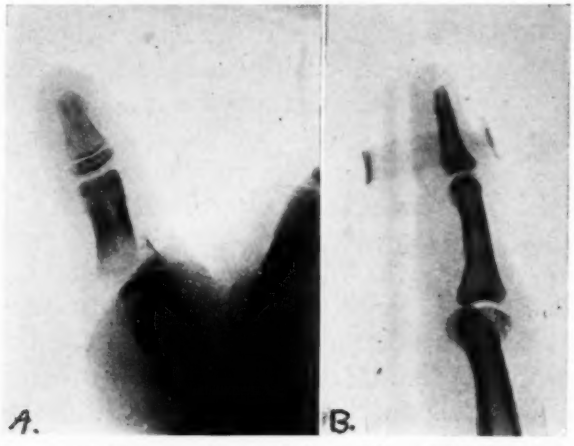

FIG. 2. *A.* Fracture into epiphyseal line. This fracture, as does epiphyseal separation, often has an associated rotation deformity. *B.* Fracture of trochlear surface of second phalanx involving joint.

SYMPTOMS

Fractures of these bones differ but little in their symptomatology from fractures in other long bones. Pain, swelling, tenderness and some deformity usually are present. As a rule, the deformity is in the nature of a widening of the finger as well as lateral and *palmar* angulation, the latter being the more common. In the distal phalanx the widening is very pronounced as a rule. Overlapping deformity with shortening is rare because of the splinting by the supporting tendons. For this reason permanent traction is seldom needed, except in comminuted, open, infected

cases. Crepitus is usually present and easily elicited. Preternatural mobility is unusually difficult to elicit, because of the shortness of the bones and the multiplicity of joints in juxtaposition.

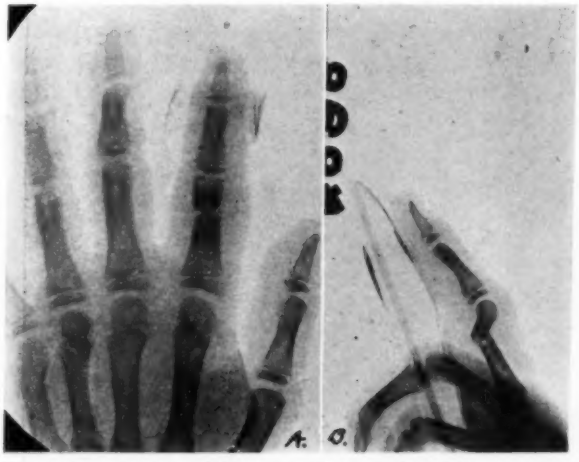

Fig. 3. Two views of fracture of shaft of middle phalanx. Note deformity resulting in appearance spoken of as "bayonet finger." This deformity must be corrected, otherwise a crippling of grip of hand will result.

Diagnosis is seldom difficult. In all cases a roentgenogram should be made. The surgeon should bear in mind that the dressings preliminary to roentgenography should permit of separation of the digits when possible. Superimposition may result in erroneous roentgen-ray reports of the condition. In examinations of the digital tuft the presence of a secondary epiphyseal center must be borne in mind. Sesamoid bones are occasionally present and may cause confusion in a suspected joint fracture. The Bennett, stave or "sparring" fracture is all too frequently mistaken for a dislocation; the latter is a comparatively rare condition.

TREATMENT

All displaced phalangeal fractures are reduced by traction and manipulation, and later splinted by the type of dressing best adapted to maintain the proper position of the fragments. Individualized treatment applies here as in all other fractures. The tuft fracture may require moulding of the fragments into closer approximation, thus correcting the unsightly flattening that would otherwise result. The fixation may be accomplished

Fig. 4. Typical deformity noted in Bennett or stave fracture at base of thumb. Note sesamoid bone which should not be misinterpreted.

by a small short wooden splint, hairpin, or cardboard fastened on the palmar surface by adhesive strips. This same dressing is applicable to all other fractures of this bone as well as to many of those of the second phalanx. For those of the proximal bone the palmar straight splint must extend into the hand, and be padded to fit the contour of the part. Occasionally the straight character of the posterior aspect of the phalanges and the metacarpal bone lends itself best to a posterior straight splint. Often better protection and fixation will be obtained if one or both of the neighboring digits be included in the dressing.

Many of these fractures, especially if multiple, or if the angular deformity is toward the palmar surface, as it so often is, will best be treated by binding the reduced fracture together with one or more other fingers around a roller bandage. A wooden ball has been used for the same purpose. Dressing in this flexed position tends to preserve the curved palmar surface

of the bones and at the same time it is the position of equilibrium of muscle pull. This is proved by the fact that the normal position of relaxation of the four fingers is that of semiflexion. Observation of anyone's hand at rest convinces one of the truth of this statement. Very occasionally in multiple comminuted digital fractures the tennis racket or bango traction may be used to advantage. The Bennett fracture is best treated after reduction by a spica dressing of liquid glass, plaster of Paris or the stave splint well known to most physicians.

Lateral, rotary and palmar deformities must be corrected with meticulous care, the first two, to prevent unsightly deformity, and the third to prevent disability due to pain incident to pressure when grasping a hard object firmly. It is better to have a dorsal "lump" than a palmar one. This palmar bowing is most likely to occur in the middle phalanx. Joint fractures require accurate reposition. Should there be any question of ankylosis, a partially flexed finger is more useful and less inconvenient than is a straight one. All uncomplicated closed fractures unite kindly in two to four weeks, without excessive permanent callus. The Bennett fractures usually result in a permanent shortening and bowing toward the radial side.

Open fractures, especially infected ones involving the joint and tendons, are prone to give poor results. If seen early the wounds should be debrided and cleansed with an antiseptic. If this can be thoroughly accomplished the wound may be loosely closed. Tight sutures will result in disaster. If the wound cannot be thoroughly cleansed or debrided it should be

Fig. 5. Hairpin splint.

Fig. 6. Posterior straight splint.

Fig. 7. Spica plaster cast for Bennett fracture.

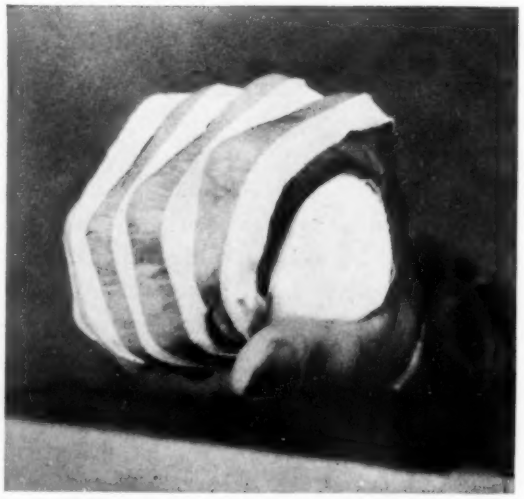

Fig. 8. Roller bandage dressing. Note that adhesive strips do not press upon nails. Such pressure would be uncomfortable in a few days and result in irregular nail growth. Bandage absent for demonstration purposes.

left wide open. From an economic standpoint of time lost, in cases of sloughing tendons and ankylosis with a resultant crippled finger only, after weeks or months of suffering, amputation is best. This, however, should be advised only after serious deliberation. The thumb and index fingers are the most important to preserve in toto.

Massage and baking are indicated early. Active exercise in the nature of grasping compressible objects such as a crumpled handkerchief or a rubber bulb or ball is desirable.

The fingers are extremely important in a patient's life. Stiffness, ankylosis and permanent deformity may result in loss of ability to continue his livelihood. These fractures may be "minor" from the standpoint of the surgeon but they are often "major" from the viewpoint of the patient.

THE CARBOLIZED SCALPEL & POSTOPERATIVE ILEUS*

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THE CARBOLIZED SCALPEL

TISSUES, even deep ones such as the pleura and the pouch of Douglas, can be painlessly incised with a sharp scalpel, previously dipped in *pure* phenol (carbolic acid).

TECHNIQUE

A dry, sharp scalpel is dipped in pure phenol. The point of the back of the scalpel is passed over the intended line of incision, so as to mark it with the phenol. A few seconds later the scalpel is dipped again in the phenol and the tissues are incised very slowly and gently, the scalpel being moved up and down as in cutting with a saw. When blood appears, a sponge or blunt retractors are applied to the tissues, if necessary. The scalpel is dipped in pure phenol as often as required. The repeated dippings of the scalpel in phenol are required in order to deposit on the blade a film of phenol, which, coming in contact with the tissues as they are cut, anesthetizes them. This film is rubbed off, however, by the tissues or washed off by the blood through which the blade passes, and therefore has to be renewed by dipping the scalpel in the phenol as often as necessary, according to the depth of the tissues to be incised.

In order to prevent burning of the skin surrounding the incision, either during or immediately after the incision is made, the skin is swabbed with a sponge soaked with alcohol. The incision should always be *very small*, a large incision is never necessary.

Painless incisions are obtained with the carbolized scalpel because the film of *pure* phenol deposited on the blade comes in contact with the tissues while they are cut. Thus by the combined anesthetizing and cauterizing action of the phenol the sensory fibers incised become anesthetized. The smarting sensation, more or less painful, which follows incisions made in the ordinary manner, is absolutely absent when the incision has been made with the carbolized scalpel.

Self draining incisions are obtained with the carbolized scalpel. This expression needs a word of explanation. The film of phenol deposited on the scalpel obviously cauterizes the tissues with which it comes in contact, i.e., the edges of the incision.

The tissues thus cauterized will not adhere to each other as readily as if they had not been cauterized. In this fact lies perhaps the greatest advantage of the method. Because of the fact the cut edges will not readily adhere, the wound will remain patent for a certain length of time. Thus when a collection of pus is present, the pus will ooze out through the open wound *without the help of any means of drainage*. Henc the expression "self-draining incisions."

Sterile Incisions. It is obvious that incisions of whatever size made by means of the carbolized scalpel are absolutely sterile. The skin does not need to be disinfected previous to incising.

USES AND ADVANTAGES

The carbolized scalpel is the ideal method of treatment for collections of pus. I might state that one will be most pleasantly surprised to see how little attention is required to obtain a complete cure in a seemingly miraculously short time of collections of pus, which previously required frequent dressing, changing of

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drains, painful manipulation, sleepless nights. Thus the treatment of cellulitis in any part of the body: abscesses of the pouch of Douglas, bartolinitis, bubos, perianal abscesses, peridental abscesses, infected glands, removal of infected foreign bodies, etc., becomes only a simple matter of *a very small* incision made with the carbolized scalpel. *No drain is ever necessary, no drain should ever be used.*

At the time of the most serious epidemic of influenza during the war Professor Buschi of Como and the writer treated more than 100 cases, some of which were in a moribund condition, of empyema thoracis by a simple intercostal incision made with the carbolized scalpel, with the most gratifying results.

The advantages of the method are self evident: It can be used in all cases, even when patients are moribund. It can be used in the most inflamed and infected tissues, where local anesthesia would be impossible and general might be contraindicated. It is the safest method of treating collections of pus, there being no danger of absorption of anesthetizing drugs. It is the only really entirely painless method. It is the cheapest from the standpoint of material used and especially from the economic point of view that the patient is disabled only a very short time, miraculously short when compared with the time required by other methods. It is the most esthetic, because only a very small incision is required, the cut edges of which, not being traumatized continuously by drains, heal promptly and practically without visible scar (this factor is really vital when pus has collected on face or neck). It is the method that frightens the patient the least, as no long and painful maneuvers and fear-inspiring instruments are required.

One word about the sterile incisions. We do not, obviously, advocate or recommend the use of the carbolized scalpel for exploratory incisions. However, there are indications for a very small 100 per cent sterile incision. So when absolutely sterile blood is desired, or previous to introducing the needle for spinal analgesia, we prick the skin with a sharp-pointed carbolized scalpel and push the needle through the nick thus made in the skin. In this manner the needle cannot possibly carry within any infectious material that might happen to be on the skin.

I do not report special cases, because the list would be too long. Suffice to say that the method has been used for the last twelve years in thousands of cases, always with complete satisfaction and that it can be applied by anyone with a minimum of surgical skill.

PREVENTING POSTOPERATIVE ILEUS BY STRETCHING THE ANAL SPHINCTERS

Ileus, one of the most common and severe postoperative complications, can, in many cases, be completely prevented, or at least made less troublesome, by the systematic dilatation of the anal sphincters at the time of operation. The dilatation should be made gently and should produce as complete a relaxation of the sphincters as is obtained previous to radical hemorrhoidectomy.

In cases where local anesthesia is used for the operation, the sphincters are stretched, after having anesthetized the anal region. In some of these cases the intraperitoneal organs, especially the small intestine and the transverse colon, must undergo, of necessity rather extensive handling. Although, even in these cases which could be called extreme, I did not notice any ileus, I do not intend to give the impression that I believe the abdominal organs can be traumatized with impurity provided the anal sphincters are dilated at the time of operation. On the contrary, I believe that they should be handled as little and as gently as possible, and that the first requisite of the abdominal surgeon is to know how to deal kindly with the intra-abdominal organs without abusing them with hands, fingers, retractors, gauze or other traumatizing agents.

This procedure has been adopted as routine in all my laparotomy cases for the last nine years. Nurses handling cases operated upon by several surgeons who did not stretch the sphincters always remark the absence or mildness of gas pain in cases operated upon by the writer; there could not be a better endorsement for the procedure.

The systematic stretching of the anal sphincters as an aid to prevent postoperative ileus seems to me to be based on sound physiopathological grounds. I do not intend to enter here into a discussion of the complicated and still obscure mechanism of intestinal peristalsis. However, I think it worth while to mention that the latest studies, especially by Bayliss and Starling and Friedlander, have demonstrated that excitation of the branches of the vagus ending in the celiac ganglion strengthens peristalsis; that the vagus exercises an inhibitory influence on the celiac axis similar to the influence it exercises on the heart; that the celiac ganglion receives from the splanchnic fibers impulses which paralyze the intestine, slowing down its movements until they stop completely; that the vagus inhibits and regulates the influence of the splanchnic fibers, so that if the vagus is stimulated the inhibitory influence of the splanchnic fibers is removed and the peristaltic waves start again. In this manner we can explain the formation of ileus not only after a direct operation on the intra-abdominal organs, but also the existence or aggravation of the same in cases of shock, renal and hepatic colic, strangulation of testicle and of epiploic hernias, torsion of pedunculated cysts and tumors, etc., and the great influence that direct trauma, hemorrhage, infection, etc., have in producing and aggravating ileus.

It follows that if the intestine is slightly paretic and gas forms in its lumen, this gas will stimulate the sympathetic impulses and establish a vicious circle, because the more gas accumulates the more pronounced is the excitement of the sympathetic system and consequently the more pronounced its inhibitory influence on the movements of the intestine, with resultant more or less complete paralysis of the same, which means ileus. This condition is aggravated by the fact that while the intestine lies more or less inert, the anal sphincters are contracted and prevent the escape of gas. Stretching of the anal sphincters relaxes the muscular fibers forming the sphincters, so that they are put in a paretic condition, absolutely unable to contract and oppose any resistance to the escape of gas.

Let us see what this condition means: The intestinal musculature, at the time of operation, even when the intestine has been severely traumatized, has not lost yet completely its power of contraction; gas, however, might begin to form, but cannot accumulate because the only obstacles to its exit, the anal sphincters, are completely paralyzed and cannot oppose any resistance; the early easy exit of the gas from the intestine prevents its accumulation, and, therefore, removes a strong factor of excitation of the sympathetic system which would not only act continuously, but the action of which would obviously become more pronounced as time passed. When the sympathetic system is not excited by the accumulation of gas, it has the opportunity to recover from the excitement suffered during the operation, and as the action of the vagus is not hyperactivated, it can more easily start normal peristalsis and prevent or minimize ileus.

I believe that stretching of the sphincters, being quite a simple procedure, should be resorted to in all cases of laparotomy or when ileus is present for any reason, because its beneficial action seems logical and there are practically no contraindications to it.

PERIANAL & PERIRECTAL SUPPURATIONS*

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BROOKLYN

PERIANAL and perirectal infections or suppurations are classified as anal, ischiorectal, retrorectal and superior pelvirectal abscesses. They are all phases of infections found in this anorectal region designated to mean the collection of pus. The pus extends or burrows along the lines of least resistance between planes of fasciae and blood vessels which are able to resist dissolution. Abscesses which are not incised extend until they reach either the skin, mucous or serous surfaces through which they discharge their contents. A collection of pus within the ischiorectal fossa will find its way along the lower surface of the levator ani and discharge itself between the internal and external sphincters, a weak point in the anal canal. An abscess may discharge its contents through the rectal wall and the skin, forming a complete fistula. A fistula necessarily begins as an abscess, simple in its onset, but may burrow and rupture at different points, causing a complicated fistulous tract. Therefore, it will be seen that abscesses in this region are necessarily forced to pursue a definite course which is changed by the relations of the original site of the abscess cavity to the surrounding planes of tissue and blood vessels.

The different sites of primary collections of pus in this region are divided into superficial and deep abscesses, dependent in most instances upon the division made by the levatores ani muscles. We may have abscesses which have their origin in the urethra, Bartholin's glands, the prostate gland, or the bony structure of the pelvis, which burrow into one or both ischiorectal fossae.

Infection may occur through either the lymphatics or the blood stream carrying bacteria from the surrounding tissue; or locally from ulcers, fissures, thrombotic hemorrhoids, tears (of the mucous membrane), or from degenerated growths in the rectum. Males at the age of thirty seem to be more commonly afflicted with rectal abscess formation. The most frequent sufferers are persons whose resisting power and vitality are lowered from acute or prolonged chronic diseases. Influenza and tuberculosis, due to their depressing effects on all the bodily functions, permit invasion of the perianal and perirectal tissue with intestinal bacteria. The bacteria found in these abscesses are single or multiple varieties of the Communis coli, Streptococcus pyogenes, Staphylococcus pyogenes and tubercle bacilli. Specific infection may also be present due to erysipelas, typhoid or syphilis. The deep abscess is of the phlegmonous type which may become gangrenous with necrosis and diffuse sloughing of the contiguous tissue. The anal abscess is the result of an infection of the follicles, the same in every respect as furuncle or acne found in any portion of the body surface.

The subtegmentary abscess is a lymphangitis and simply an infection carried through the lymphatics.

The subcutaneous and submucous abscesses are due to infection as a result of a lesion in the anal canal or rectum. The infection is carried from the anal or rectal region through either the lymphatics or blood vessels into the cellular tissue, later causing a circumscribed abscess.

ISCHIORECTAL ABSCESS. This is the result of an invasion by bacteria of the ischiorectal fossa which is an easily invaded region. The loosely connected fat and deficient blood supply of the ischiorectal

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fossa render its resisting power extremely low, and when infection is carried within its tissue the result is a very rapid abscess formation. The resistance to bacterial infection is so low that the tendency is, as a rule, to involve the entire cavity of one or both sides. Extension is impeded fortunately by the strong resistant tissue in the form of fasciae and muscles. The most common point of exit for these abscesses to discharge into the rectum is at the junction of the internal and external sphincter muscles. The extension of pus to the opposite side of the rectum is also made possible by the weak point at the junction of the levatores ani and the upper surface of the anococcygeal ligament. This weakness, which permits rupture of the abscess into the rectum at this point in the barrier, is supposed to be due to prolonged straining during defecation, as the attachment of the anococcygeal ligament to the external sphincter muscle and the incomplete attachment of the levatores ani muscles form a fixed point which under severe strain at defecation becomes weak and separates the tissue. The separation of the tissue permits infection of the fossa. The trauma from strain is frequently the cause of fissure and the site of a fistulous opening, the result of abscess formation in the fossa. An abscess will very often burrow down through the separation between the outer and deeper fibers of the external sphincter muscles where the longitudinal muscle fibers of the rectum pass through to their skin attachment. A complete fistula may be formed when an abscess follows the course of these fibers. In this manner pus may completely surround the lower part of the rectum, dis-

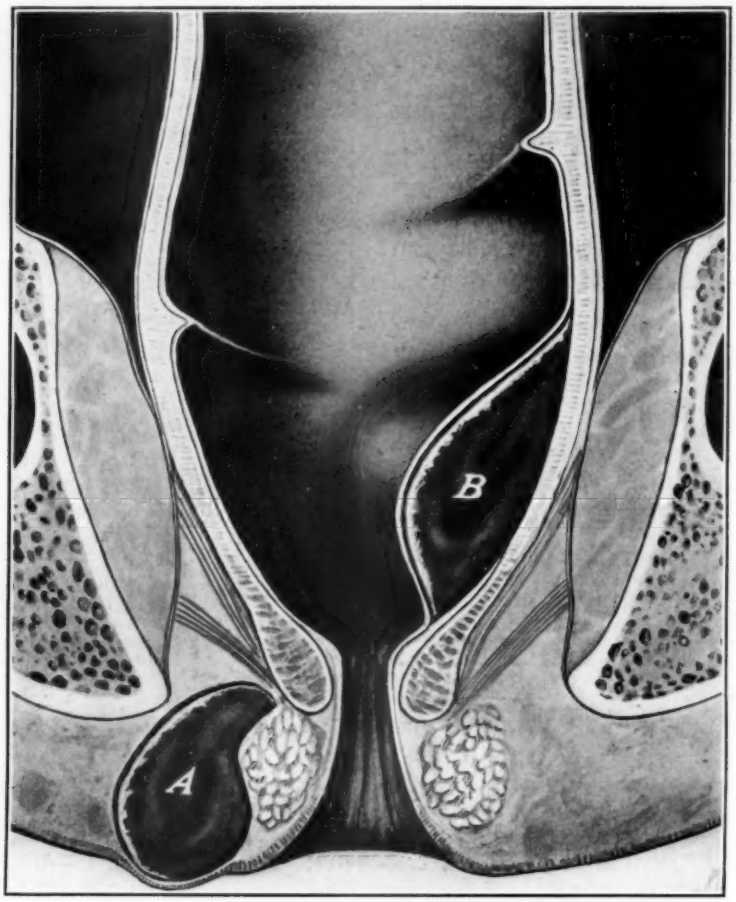

Fig. 1. *A*. Ischiorectal abscess. *B*. Submucous abscess.
(From Bodkin's "Diseases of the Rectum." E. B. Treat & Co.)

charging in the median line posteriorly, after an invasion of both ischiorectal fossae, at the weak point formed at the junction of the levatores ani and the anococcygeal ligament.

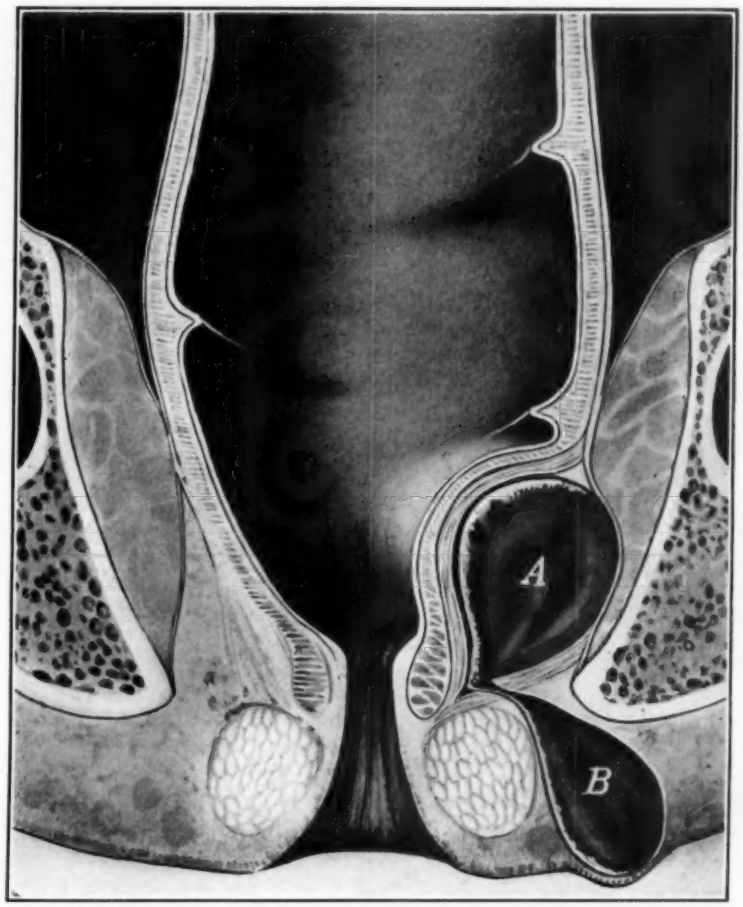

Fig. 2. Rectal abscesses. *A*, Pelvirectal abscess. *B*. Terminating in ischiorectal abscess. (From Bodkin's "Diseases of the Rectum," E. B. Treat & Co.)

Abscesses which have their origin in the ischiorectal fossa anterior to an imaginary transverse median line, drawn from right to left, are more superficial in their course than those starting posterior to that line.

Symptoms. The general symptoms are the formation of pus such as occurs with ordinary abscesses. There may be a chill, rise in temperature, quickened pulse and pain varying in degree according to the location and extent of tissue involved. The anal, tegmentary, and subtegmentary abscesses being so superficial may be marked by hardly more than itching, redness and discomfort in sitting. The ischiorectal abscess is very often associated with retention of urine and a sensation of weight in the rectum which is relieved by its spontaneous discharge into the rectum. Should the abscess cavity refill the symptoms recur with the exception of the retention of urine. Very often these abscesses, when not properly treated, refill repeatedly at periods for years.

Treatment. The superficial tegmentary and subtegmentary abscesses yield readily to the application of lysol, or carbolic acid neutralized with alcohol. It is much more satisfactory to incise the subcutaneous abscesses, when they have burrowed, under local anesthesia. The incision should be T-shaped with the top of the T toward the anal opening, to afford free drainage and to insure granulation from the deepest portion of the wound.

The ischiorectal abscess requires incision over the abscess and through the external sphincter to drain the cavity in order to make a wide open wound. The T-shaped incision is advised for this purpose also but reversing the T so that the top of the T is over the abscess cavity and the bottom of the T cuts through the external sphincter muscle into the anal canal. The wound should be irrigated with water and curetted lightly. The cavity should be cauterized with lysol or carbolic acid which should be neutralized with alcohol and then packed with plain gauze to be left in position for two days. These abscess cavities are best treated without further packing. The submucous abscess requires often the dilatation of the sphincter muscle and therefore requires the use of a general anesthetic. An incision should be carefully made parallel to the long axis of the rectum through the entire length of the abscess in order to prevent later the accumulation of pus in a poorly drained pocket. Should the burrowing extend for a distance of more than 3 inches upward on the rectal wall, great care should be exercised to avoid penetrating the peritoneal cavity. Bleeding is usually quite free after a primary incision of the submucous abscess and requires firm packing with gauze.

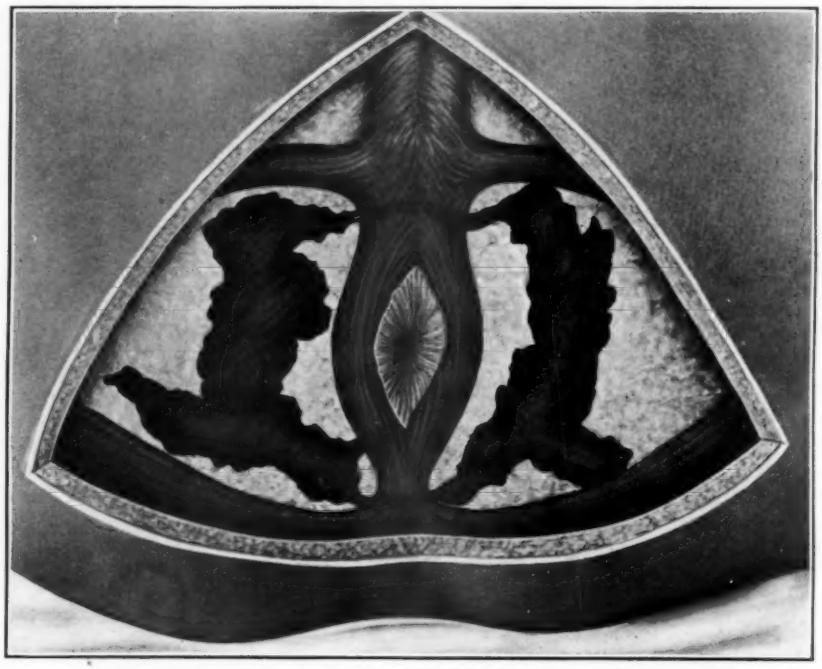

Fig. 3. Horseshoe fistula, result of pelvirectal abscess.
(From Bodkin's "Diseases of the Rectum," E. B. Treat & Co.)

Pelvirectal and Retrorectal Abscesses. The pelvirectal abscess results from infection of the loose connective tissue situated between the levatores ani below and the peritoneal wall above, in the portion of the pelvic cavity known as the superior pelvirectal space.

The retrorectal abscess has its origin in the connective tissue between the sacrum and the rectum posteriorly.

The connective tissue of the pelvirectal space is part of the common tissue of the mesorectum in the male covering the prostate gland and neck of the bladder, and in the female within the broad ligaments.

Infection of the superior pelvirectal space may be carried through the lymphatics or blood vessels from adjacent pelvic disease, rectal operations, or sepsis during the puerperium. The pus may pass downward and penetrate the separated fibers of

the levatores ani at the junction of the levatores ani and external sphincter muscles posteriorly, forming an ischiorectal abscess also. There abscesses are always a serious condition and the prognosis is variable and dependent upon the original source of the infection. A diffuse cellulitis may be followed by peritonitis should the pus burrow into the general peritoneal cavity. A deep posterior or anterior horseshoe fistula or a rectourethral fistula may result from these diffuse infections of the pelvirectal space. The posterior horseshoe fistula is more commonly the aftermath of the pelvirectal abscess.

The symptoms of pelvirectal abscesses appear suddenly and are masked by the complications of the original site of infection which may have been located in a neighboring organ for a long time.

If the abscess points into the ischiorectal fossa, the treatment is the same as for the uncomplicated ischiorectal abscess. To ameliorate symptoms, incision of the abscess should be made at once.

The origin of the infection should guide the further treatment and may require the vaginal incision of a pelvic abscess or, exceptionally, an abdominal section. Should the incision be carried higher that the levator ani muscle, the wound must be packed tightly for a few days to avoid severe hemorrhage. However, the incision should not be made through the internal sphincter, otherwise incontinence will result.

After-treatment. The subsequent treatment of incised abscesses in the rectoanal region is often more important than the primary incision. The primary incision may be the best method for the immediate relief from pain and suffering, but will not afford freedom to the patient from the discomfort and misery of a protracted fistula discharging itself from the former site of suppuration in the pelvic or rectal region. Failure to cure these patients may be attributed to a lack of knowledge on the part of the surgeon, or to his inability to impress upon the patient, at the beginning of his professional care, the great necessity of after-treatment. It is best to insist upon frequent treatments at intervals of two or three days, until the fistulous tract is healed. Usually a pelvirectal or ischiorectal abscess will require from eight to ten weeks to bring about a successful termination. Ichthyol, argyrol, silver nitrate, tincture of iodine or balsam of Peru are commonly used to stimulate granulation. Nitrate of silver is best suited for the tubercular types. The very free use of plain sterile warm water has proved a most efficient cleansing agent.

The pus from an abscess in this region should be submitted for examination by the bacteriologist in order to rule out the possibility of tuberculous infection. It has been my misfortune to find unsuspected cases suffering from a tubercular infection. The application of the actual cautery when practical, or the use of nitrate of silver as a routine treatment is protective. This procedure tends to destroy the tubercle bacilli without extensive destruction of the underlying tissue. The barrier nature has previously built up around the abscess and fistulous tract, to protect the patient from further infection, remains undisturbed.

In the after-treatment of these wounds, one should thoroughly dilate with the fingers in order to break adhesions at the sides which leave areas higher up unhealed. The granulating process must be forced to advance only at the extreme bottom of the wound so as to prevent the formation of a fistulous tract covered by healthier surfaces nearer the skin.

FOREIGN BODIES IN EAR & NOSE*

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ALL children tend to put small objects in the mouth about as soon as they can handle anything. The reason is evident since the mouth is the young child's organ of information as to the character of external objects.

Older children have a tendency to put foreign bodies in the ear and nose as well as in the mouth. The reason for this is not quite as clear but possibly is due to the child's habit of feeling the skin with various objects, especially smooth ones.

FOREIGN BODIES IN THE EAR

The foreign bodies placed in the ear consist of any small objects which a child can handle and which may be put in the ear. Common ones are peas, beans, beads, small pieces of stone, bits of rubber, chalk, pieces of nut, pencil tips, bits of cotton, bits of wood and the like. In addition and more often in older persons flies and other insects occasionally make their way into the external ear canal.

Sudden deafness in children, pain limited to one ear without apparent cause or inflammation with or without a history should make one think of the possibility of a foreign body and an examination should be made. In young children both the examination and the removal may be difficult on account of the fear of the child that he is going to be hurt.

A foreign body in the ear canal is seldom an emergency and no attempt should be made at removal until prepared to cope with any situation which may arise. Take time to get ready for its removal if there is any likelihood that it will be at all difficult. Children do not hold still for work on their ears and are frequently very much frightened before anything is done. All the procedures for the removal requir a quiet patient and are usually done under a reflected light. If it is found that the child is restless, fearful and will not remain quiet it is better to give at once and before any manipulation a general anesthetic.

Good illumination from a forehead mirror or from some source of electric illumination or clear daylight is essential. If the foreign body is deep in the canal reflected light is absolutely necessary. A good-sized ear speculum, a plunger syringe with small tip or a small soft rubber syringe, two small wire curettes, one with smooth edges, the other sharp, and bent at a slight angle on the shaft, an ear spoon, such as was formerly in every physician's pocket case, a small short hook at nearly right angles to the shaft, and ear forceps are the instruments required. There are two types of ear forceps, the small angular type made so as to be opened as widely as possible in the canal and the Sexton type with parallel blades. The forceps are only to be used when the object has been drawn far enough forward to be readily grasped. No light ear forceps will hold the foreign body if it is firmly packed within the canal.

The first examination is to ascertain the position and nature of the foreign body and how long it has been in place. If very recent, attempt to remove at once. If it has been present for some time and the canal is swollen wait for this swelling to go down, as much harm can be done by ill-advised attempts at removal. The ear canal readily bleeds if traumatized even slightly and this bleeding is often very persistent and masks the foreign body, hence every care must be taken to prevent this bleeding.

If the object is small and not too tightly packed it can usually be removed by syringing. Use plain warm water or warm water and boric acid and lifting the auricle

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upward so as to straighten the canal as much as possible, direct the stream backward along the ear wall so as to get the water behind the object. If it is a pea or bean or anything that can swell it may be so swollen that the water cannot get behind it. Here the spoon-shaped instrument or the small curette or hook may serve excellently. If the child is quiet these instruments can be slowly worked around and behind the object. Do not use force from below upward but on the anterior and posterior and upper sides of the canal since if the object is at all deep, by working from below it might be possible to push the object into the middle ear cavity and then into the attic. This has happened. In such a case the extraction becomes very difficult and should be done by one trained in aural surgery. In using the syringe a considerable degree of force is required as it is the pressure of the water behind the object which is going to remove it. In using the short hook always introduce along the side of the canal in such a way as not to traumatize the canal. Kerrison has invented a ring curette which can be introduced along the canal and behind the object and then brought to any angle up to a right angle; it is smooth and does not traumatize. It has the possible disadvantage that it has to be so small that it cannot be made strong enough to bring any appreciable pressure on the object and is not as practical as the small ring curette firmly attached to a small straight handle.

A glass bead is very difficult to remove if impacted but if it has a center hole it may be possible to so manipulate it as to get the short hook into the lumen of the bead.

If unable after proceeding in this manner to remove the foreign body and if it is firmly impacted deep in the canal the patient should be sent to a capable aurist. In such a case the posterior membranous canal wall is detached and brought forward as in the radical mastoid operation. The foreign body can then be gotten at from behind and brought forward and removed under good illumination. The wound is then sutured, the canal lining carefully replaced and held in place by a gauze pack for a few days, Healing is prompt and usually without incident.

Insects are best removed by syringing. They are very annoying, especially the buzzing kind. Simple syringing may be tried and if they do not come out readily they should be killed with oil or chloroform before further attempts at removal. Flies have even laid their eggs in the ears and maggots have formed there. Do not attempt to remove a fly with forceps even if visible. The insect will be hard to grasp and there is danger of doing injury with the forceps.

Removal of Cerumen. Many people suffer from hardened wax in the ear canal and the technique of its removal, while as a rule simple, may be difficult of accomplishment. The reason is that the ear canal is sometimes irregular and narrow at the junction of the membranous and bony portions. The wax becomes hard and attempts by the patient to remove it with the finger only force it more deeply into the canal.

Patients often complain after sea bathing of what they call "water in the ear" when the real trouble is due to water in the external canal which has caused swelling of hardened wax, and the deafness and discomfort that follow are due to pressure of this wax against the drum.

For removal of cerumen a solution of bicarbonate of soda (a teaspoonful in a bowl of warm water), a syringe and a small smooth wire ring curette are all that are necessary. The bicarbonate of soda will soften the wax sufficiently if the wax is not too hard. If the wax is very hard it may be softened by packing against the mass a cotton pledget soaked in peroxide of hydrogen. Leave this in place for a short time and follow with syringing, repeating the peroxide if necessary until the wax is all out. Sometimes very rigid masses of cerumen which are resistent to syringing

can be removed by inserting the smooth ring curette alongside of the mass, which may then come away as a whole without difficulty.

On the other hand, masses of cerumen are somet mes very difficult of removal and too long efforts should not be made at any one time. Instruct the patient to fill the ear with peroxide of hydrogen every morning for two days and then return. At the second sitting little difficulty will be experienced with removal. When the wax is all out the drum will be plainly visible. Inspect and dry the canal afterwards and be careful not to injure the canal or cause it to bleed as this bleeding has a tendency to continue and may be annoying.

FOREIGN BODIES IN THE NOSE

Pus discharge in the nose, especially if one sided and not readily explainable, should make one think of a foreign body as a possible cause. This applies to adults as well as children, though not as often. Children occasionally put foreign bodies in the nose which, not producing much trouble at the time, are unnoticed and may remain for years. I have twice removed metal buttons which had been present in the nose for several years. In one case relief was sought for an annoying one-sided discharge and in the other a diagnosis of nasal syphilis had been made and much medicine taken. Both cases promptly recovered when the buttons were removed. The foreign body if in place any length of time will be incrusted with lime salts and may be called a rhinolith. The objects introduced are as various as those introduced in the ear: peas, beans, buttons, beads, small stones of the street, pencil tips, shoe buttons, nuts, erasing rubbers, pieces of chalk, pieces of sponge, cotton tampons and so on. Nose bleed is not uncommon in childhood and adult life and any object introduced to stop this may be pushed far backward and may not be able to be removed by the person himself. It may even be forgotten and become lime incrusted and carried for a long time before relief is sought.

The symptoms are referred mostly to one side and are difficulty in breathing and often foul-smelling discharge. In children under seven years of age a one-sided discharge lasting longer than a week or two should suggest the possibility of a foreign body.

Reflected light and a quiet patient are essential for both examination and removal. A nasal speculum, spoon curettes, preferably smooth edged, a long silver probe, cotton applicators, a stout toothed nasal forceps with a long blade and scissor handle, and a syringe are the instruments required. If the object is irregular a snare may be helpful. Cleanse and cocainize the nose first of all and use adrenalin or some such substance to contract the tissues. If the supposed foreign body is not readily seen examine carefully with the long silver probe. This will usually reveal its presence and position and give information as to its character.

Syringing may be used but there is the danger of pushing the object further backward. It is most efficient when used through the opposite nostril but much force cannot be used on account of the danger of forcing water into the ear. The forceps and short hook on a long shaft and smooth-edged curettes are the most useful of the instruments. If the body is round like a bead it is safest to put the forefinger of the opposite hand in the nasopharynx so as to avoid any possibility of the foreign body going down the bronchi; this is especially necessary if an anesthetic has been given.

The question of anesthesia must be considered in each individual case. It is better to give an anesthetic than to struggle with a frightened or unruly child who is afraid, and often with good reason, of being hurt.

COMMON DISLOCATIONS*

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CHICAGO

FOLLOWING the great development of the automobile as the dominant factor in human trauma, statistical studies of dislocations have been discarded. So varied are the resulting blows, crushings, and twistings of automobile accidents to pedestrian and passenger that dislocations are seen by every physician. In relative order of occurrence they may be listed as dislocations at the shoulder 60 per cent, elbow 6 per cent, hip 5 per cent, knee 3 per cent, thumb, jaw, wrist and ankle between 2 per cent and 1 per cent of all dislocations. True wrist and ankle dislocations are very rare; they are nearly always accompanied by fracture; in fact every ankle fracture involves more or less dislocation but fracture must be considered primarily at that point.

In the diagnosis of common dislocations the paramount feature is rigidity of the joint and part involved—very different from fracture which usually leads to increased or unnatural mobility. Either may be accompanied by pain and interference with function, but the acutely dislocated limb is so painful that any attempts to test the rigidity are met by powerful protests on the part of the patient. It is really inhuman to attempt to feel crepitus in differentiation between fracture and dislocation when our most valuable adjunct for diagnosis, roentgen-rays, is available everywhere. The use of roentgen rays is absolutely necessary to establish the diagnosis and the extent of the pathology. A fracture complicating dislocation can thus be ascertained and the possibility of manipulative reduction or the necessity for other steps in treatment decided upon.

The treatment of common dislocations may be briefly stated: First, examine superficially for evidence of real nerve or blood vessel injury and record in writing at once; then obtain roentgenographic confirmation and determine the extent of the injury, including accompanying fracture. Reduction must follow as soon as possible. The sooner proper reduction is accomplished the less one may expect a complication and difficulty in reduction. A general anesthetic is required almost always for manipulative reductions. In the case of the larger joints the patient should be taken to a hospital if possible. Always in case of shoulder and hip dislocations one must be sure that anesthesia is carried to a stage of complete relaxation; there will be less secondary tearing of joint capsule or other malicious damage. All manipulative reductions must be gently performed; force avails little, is amateurish and damaging. If gentle efforts fail, desist. Do not hesitate to call for consultation and help from a colleague. Manipulation takes advantage of untorn parts of joint capsules and muscles attached to the bone. It depends on leverage action and permits a natural guiding help of the untorn parts about the joint.

Continuous traction may also be used to pull a joint back into normal position. This method does not require general anesthesia. Either a small amount of local anesthesia injected about the joint or none at all is used. The limb is put in traction in the axial direction which will lead to reduction and as the pull is maintained for some time, the spastic muscles loosen and the part gently returns to a normal position. Gravity can thus be used as the active reducing force, especially in dislocations at the shoulder.

After hip dislocations frequently the greatest errors in treatment are on the part of the person attempting a reduction, even the physician. Usually the anesthesia

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is not complete; efforts at reduction are started before there is full relaxation of all muscles about the hip joint. Muscular spasm is caused and the attempts at reduction fail, leading to repeated and often forceful or wild efforts. Complete deep anesthesia must be obtained first. A second error is for the reduction to be attempted while the patient lies on a table, usually an operating table, the surface of which is too high for the average physician to manipulate a leg with steadiness and power. If all patients with dislocations of the hip could be thoroughly anesthetized and then laid gently on the blanketed floor, reduction would usually follow at the first attempt, often simply from flexion of the thigh on the trunk followed by gentle outward rotation of the leg as the physician bends over the patient. If this method fails the patient lies in the most favorable position for the use of Allis' method, i.e., lifting the thigh upward and gently pulling the head of the femur into the hip joint.

After reduction very gentle handling of the limb is necessary. One must make sure that the peripheral blood and nerve supplies are intact and in most instances a splint or bandage is required to hold the parts in relaxation to permit healing of the joint capsule. Always obtain a post-reduction roentgen-ray examination. An undiagnosed fracture may then be found which calls for further treatment.

The prognosis for complete recovery after dislocation depends on whether or not anesthesia is used, the gentleness of the reduction, the thoroughness of the reduction as demonstrated by roentgen-ray examination and a proper period of post-reductive rest for complete capsule healing. Frequently firm joint capsule healing takes a longer time than bone healing after fracture.

Recurrent and habitual dislocations can be avoided largely by attention to these elementary points. Most shoulder dislocations require eight weeks' rest before full use, especially before abduction of the arm is permitted. A recurrent dislocation should always be a source of embarassment to the surgeon. The patient must keep the joint quiet until the joint covering will bear the brunt of motion without stretching or tearing open again.

It has always been the writer's habit to give the patient typewritten instructions after reduction of a dislocation. These vary with the joint involved. In the case of the common dislocation at the shoulder the patient is advised:

1. Not to raise the arm above a right angle to the thorax for at least two months after the dislocation.
2. All motions with the injured arm in dressing and bathing which involve reaching must be avoided for a similar period.
3. In crowds keep the hand of the recently reduced dislocation in the coat pocket.
4. Do not run to jump on a street car or any moving conveyance where the arm might be jerked.

RATIONAL TREATMENT OF BURNS*

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BROOKLYN

THE necessity for the prompt institution of rational methods of treatment for burns makes it desirable at this time to review the many methods in use. There is no existing perfect treatment, but from the consideration of the pathological physiology involved it is obvious that definite factors must be dealt with in order to justify the retention of any suggested method of treatment.

A burn is a wound caused by heat, light or chemicals. It differs from the ordinary wound in that there is usually a greater amount of tissue destruction. We speak of burns according to degree, but unless we use one standard classification, this method of description is confusing. The most satisfactory classification is that of Dupuytren which is as follows: (1) erythema; (2) blistering; (3) partial destruction of the skin; (4) destruction of the entire thickness of skin; (5) destruction of the subcutaneous tissue and muscle; and (6) destruction of the entire part including the bone. Such a classification places the depth of the burn at an anatomical level.

It is generally agreed that the extent of a burn is much more important than the depth, indeed burns of the first degree covering two-thirds of the body surface are frequently fatal. Burns of the second degree or greater involving one-third of the body surface are usually fatal. In children the margin is smaller than in adults. When may a burn be called serious? A reasonable suggestion is that a serious burn involves one-tenth of the body surface.

The changes produced by a burn are local and general. Locally there is a destruction of tissue. There is an inflammatory reaction of the zone between living and dead tissue in an effort to cast off the necrotic material as a slough. So long as the slough is present there is absorption going on of toxic products of protein decomposition.

The serious burn produces systemic changes which vary in intensity with the extent of the burn. These changes may be described in the two stages in which they occur. The primary condition is one of shock. The clinical manifestations of this condition are lowering of the consciousness, pallor, subnormal temperature, cold moist skin and low blood pressure with a rapid pulse of small volume. All deaths occurring in the first twenty-four hours are considered as being due to primary shock.

Beginning after twenty-four and usually before seventy-two hours the secondary stage manifests itself by delirium or coma, vomiting, high temperature and rapid pulse. At this stage degenerative changes are found in many organs. These changes are due to the absorption of toxic primary and secondary proteoses formed in the breaking-down of the devitalized tissue.

The most constant change is a degeneration of the adrenals. The liver and kidneys also show degenerative changes. The urinary output is decreased and albumin, red cells and casts are found in the urine. Blood studies show a concentration and the degree as measured by hemoglobin estimation may be used as an index of the toxicity. The blood chlorides have been found to be low and proportinate to the amount of tissue destroyed. Hemorrhagic areas are sometimes found in the mucosa of the gastrointestinal tract and rarely an ulcer is formed. When large granulating areas are formed there is a great loss of body fluid through these surfaces.

Burns heal finally by epithelization from

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the periphery, the stratum germinativum, if it be intact, the epithelial lining of the hair follicles and skin glands, or from some form of skin grafting. Contractures are prone to develop in burns over joints and about the neck.

With an appreciation of the changes which occur in the burned patient it is a simple matter to formulate the requirements of a rational method of treatment. The primary shock must be treated; in so far as possible the secondary stage of toxic protein absorption should be prevented; toxemia must be dealt with when it develops; and locally a clean surgical wound is the goal.

Primary shock is treated by morphine in generous doses for relief of pain. External heat is supplied by warm blankets, hot water bottles or electric warmers. Saline or glucose is given intravenously or subcutaneously to make up the fluid volume. At this stage the margin of safety is very narrow so nothing is done that will in any way add to the serious state of the patient. The clothing need not be removed. The local condition is of secondary importance. When the pulse improves and the blood pressure rises, the clothing may be removed and local treatment instituted.

For the local treatment of burns a multitude of remedies have been used. Undoubtedly most of these are satisfactory in the minor burns, those which are not extensive enough to cause appreciable systemic changes. Warm moist dressings of boric solution or soda bicarbonate work well. Bland ointments such as boric are satisfactory. Picric acid in aqueous solution or combined with butyn in an ointment gives relief of pain. It must be emphasized however that symptoms of poisoning have developed from the use of picric acid over extensive burned areas. The application of paraffin in such combinations as ambrine has many supporters. This material is sprayed over the burn at a temperature just above its melting point. It gives relief from pain, splints the area and allows healing to go on under an airtight coating.

All of the above methods of treatment should be used under aseptic precautions and after careful debridement and puncture of blebs.

It is in the case of the serious burns, those especially in which the margin between life and death is narrow, that we must use a treatment which is based upon an appreciation of the pathological physiology which was discussed earlier. Our treatment must aim for these principles; diminution of toxemia, asepsis, relief of pain, prevention of fluid loss and the prevention of deformities. Some years ago in an effort to reduce the toxemia many burns were treated by radical excision of all the necrotic tissue and of course a great deal of viable tissue was removed with the dead. This method was found to be very shocking in patients who were always poor surgical risks.

As a substitute for excision there has been developed by Davidson the tannic acid treatment. The object of this therapy is to fix the destroyed protein by chemical means, rendering it unabsorbable. Moreover, tannic acid, which is a mild antiseptic, gives rapid relief from pain, has no effect upon living tissues and forms a dry crust which retains body fluids and permits healing to progress beneath.

The great popularity of this treatment is well deserved, being founded on a rational basis, and clinically producing a decided drop in the mortality rate in a large series of cases.

Tannic acid is used in a freshly prepared 2 or 3 per cent aqueous solution. It is applied by saturating the gauze dressings over the burn, or by spraying directly over the exposed burned areas at frequent intervals. The surface is first cleaned with saline or boric acid solution and gross particles of dirt removed. From eighteen to thirty hours after the application has started the burned area assumes a mahogany brown color. Then the process of tanning is complete. Dressings are removed and the surfaces exposed to dry heat, best with an electric baker over the bed. There

is then a wound covered by a dry crust; it is relatively insensitive, an unfavorable place for bacteria to develop and demands no tedious painful dressings.

Beginning in six to twenty days, according to the depth of the burn, the crust begins to separate. Epithelization may go on under the crust from the remaining viable cells of the germinating layer, hair follicles or skin glands. In the deeper burns a granulating area is present which is ready for skin grafting.

Occasionally infection occurs beneath the crust during the tannic acid treatment. This condition manifests itself by fever, redness about the periphery, and tenderness over the crusts. Without delay the tanned material should be excised and a dressing saturated with 1:5000 acriflavine applied.

The prevention of contractures should be constantly kept in mind and if necessary splints should be applied to the extremities.

During the first five days, systemic treatment is pushed to lessen toxemia. Fluids are forced, and saline is given subcutaneously to keep up the blood chloride level. Blood transfusions are of great value at this stage. The degenerative changes which occur in the adrenals would seem to warrant frequent small doses of epinephrine.

SUMMARY

Minor burns may be satisfactorily treated by several methods which relieve pain and allow healing to progress under aseptic conditions. In the burns of serious extent general treatment must be instituted for primary shock and toxemia. The local use of tannic acid has diminished the amount of toxic absorption and produced a type of wound which is dry, insensitive and aseptic. Because of these facts and the reported decrease in mortality since the introduction of tannic acid, this is the treatment of choice in all serious burns.

SPRAINS AND INJURIES OF FINGERS AND TOES*

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RALEIGH, N. C.

SPRAINS are nearly always treated by one of two general plans. The first, chronologically speaking, may be called the rest-heat-massage-treatment, and the second the support-and-use treatment. Experience has taught us that the second plan, used intelligently, gives quicker and better results, and fits the requirements of industrial surgery. On the other hand, the rest-heat-massage treatment is more comfortable and for a clientele more elite than ours (whose comfort is more important than their time) may serve the purpose better.

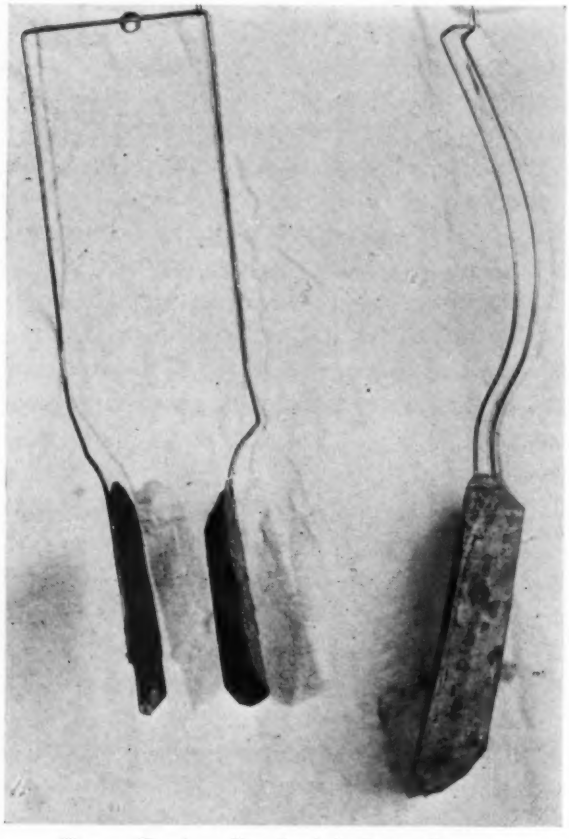

FIG. 1. Banjo splint for injuries to fingers.

In the support-use treatment one must give enough support to protect the injured ligaments and not so much as to impede unduly the use of the part. Take a sprained ankle, for example: A few strips of adhesive plaster extending an inch or 2 above the ankle cannot give any material support to that joint. Adhesive should be used freely; a stirrup of adhesive extending up to knee joint on both sides of the leg forms the foundation strapping, while additional criss-cross straps are used for reënforcement. On the other hand a plaster cast is too much; it impedes the use of the part and prolongs convalescence as in the rest-heat treatment. In treating sprains of any part of the body, the same general principles hold good. It is, of course, important to be sure of the diagnosis; nothing is more embarrassing than to have a sprained ankle turn out to be a Pott's fracture.

Injuries to Fingers and Toes. If any statistics were available—(which they are not to me). I have no doubt that injured fingers and toes would be found to blame for a large part of the time lost through industrial accidents. In the first place they are always getting hurt and in the second place they frequently do not get the respectful treatment they deserve.

An infected wound in a finger may cause as much disability as an infected wound elsewhere and the same care should be taken to prevent infection. Fractures of metacarpals and phalanges are fractures after all and a great deal of unnecessary disability results from inadequate treatment.

One of the common injuries to fingers which causes us some concern in deciding on treatment is amputation of the extreme end of the finger without exposing the bone. To re-amputate and secure a proper wound

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closure or to leave the wound open and allow it to heal by granulation is the question. Our experience is: When in doubt, reamputate; this gives a much quicker recovery and the final result is more satisfactory.

Ordinary lacerated wounds of fingers and toes should receive a careful surgical cleansing and primary suture, this being done under local anesthesia if necessary. Often in a simple laceration there is the temptation to let it go with only a dressing, but such treatment always adds materially to the loss of time from work. We believe that a saving of fifteen or twenty minutes in time at the first treatment will often result in a loss of as many days before recovery is complete—penny wise and pound foolish.

Fractures of fingers and toes, metacarpals and metatarsals, deserve much the same consideration as shown to other fractures. Proper reduction, checked by roentgen ray and suitable retention apparatus, is indicated and must be employed if disability is to be avoided. All of this is particularly true in the hand where the function of each part is more individualistic and refined.

Some type of banjo splint is often of great value where reduction can be retained only with continuous traction. Figure 1 shows two splints of this sort: A is for several fingers and B for one finger. These splints are readily made to suit the individual case by soldering a piece of bent wire to some bits of sheet iron. The splint may be secured to the forearm by adhesive strapping or incorporated in a light plaster cast. Traction is obtained by rubber bands secured to the finger with adhesive strapping, and tied to the end of the splint.

TOPICAL TREATMENT & SURGICAL DIATHERMY FOR LEUCORRHEA*

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RALEIGH, N. C.

TO the surgeon doing more or less gynecology come many cases which demand mature judgment in determining what procedure to undertake to produce the best result for the patient at the particular time, all circumstances bearing upon the future of the patient being considered.

Foremost among these are those cases of leucorrhea of the non-specific types. Most of them are the result of laceration or erosion following childbirth. Some result from anemia or malnutrition, or pelvic congestion from extragenital causes, or retrodisplacement of the uterus, fibroids, polyps, inflammation or ulcer of vulva, vagina, endometrium, or malignant disease. The etiology suggests the type of treatment.

It is to those forming the largest percentage of cases, namely those due to lacerations or malposition, or both, that I wish to pay particular attention. Many, no doubt, demand ultimate operative procedure for cure; but so many are in women of child-bearing age that repair in such cases would only result in further lacerations in delivery. Obviously it is folly to operate upon such women unless the condition is so bad that waiting would bring on malignancy. On the other hand, to do nothing to many of these cases means inviting malignancy. It is for such cases that I wish to suggest the following treatment Many times a cervix is so edematous, boggy and inflammatory that it simply cannot be repaired. In such cases the treatment often results in a return of the tissues to a much more normal state, lending them to an easy and successful repair.

The treatment is of two kinds: topical methods and surgical diathermy.

1. *Topical treatment* consists in bi-daily hot vaginal douches, using hypertonic salt solution at temperature as hot as bearable, ranging from 108° to 118°F., using about six quarts of this solution, the patient lying in recumbent position, preferably, in a bath tub taking about fifteen to twenty minutes to carry out the procedure. The depleting action of this douche contracts blood vessels and relieves congestion by osmosis and promotes normal pelvic circulation and healing.

At intervals of from five to ten days, depending upon the response to treatment, the outer cervix and canal are cleansed with Dobell's solution to rid them of mucopurulent material and painted with Churchill's tincture of iodine. A wool tampon charged with equal parts of glycerite of tannin, ichthyol and glycerine is applied and left in place for eighteen hours or so and removed by the patient herself. From eight to ten such treatments will cause healing of the average moderately severe case. In those cases where return of symptoms occurs, treatment can be repeated.

2. More recently surgical diathermy has been tried by us with good results in those cases where a radical procedure such as the Sturmdorf operation, or radical amputation, did not seem warranted. This method has been found particularly helpful in stopping leucorrhea in patients who have had supravaginal hysterectomy. In such cases the entire remaining mucosa can be destroyed. By this method of treatment there is practically no scar formation and results are most gratifying. We feel that there is less scar tissue found following this treatment than operation, and it seems preferable certainly in those cases where further pregnancies are anticipated.

All these procedures can be carried out in the office.

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THE PRESSURE DRESSING*

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TO V. P. Blair[1] is due the credit of insisting upon the value of mechanical pressure in the healing of wounds. "In much of the reparative surgery," Blair remarks, "the operator will be tremendously handicapped until he realizes that the satisfactory result is more dependent upon the intelligent application of the older surgical principles than upon an aseptic technic as ordinarily interpreted, though the latter is never to be disregarded." Of these "older surgical principles" he considers properly applied pressure one of the great aids to the natural healing forces and emphasizes its four fundamental advantages:

The elimination of dead spaces.

The control of oozing.

The limitation of venous and lymph stases.

Limitation of the amount of plastic material that pours into the wound.

These observations made from a very extended experience in so-called plastic operations apply with equal force to general surgery. Instances are not wanting to prove the beneficent influence of pressure in every division of surgical practice. Witness the frequent employment of a balanced pressure in surgery of the eye, nose and throat, in orthopedic surgery, in the surgical treatment of chest and abdominal diseases. A firm bandage, a snug splint, a uniform support not only promote the comfort of the patient but also hasten healing, far ahead of loose, sloppy dressings. Quite the reverse is true of pressure applied too tightly and too continuously. Intermittent pressure, as obtained through massage, has its definite uses.

For the past two years I have been interested in the effectiveness of a pressure-dressing applied to incisions in clean cases as well as in those needing drainage. The principle concerned is very old and nothing new or original is claimed for its application. Rather a plea might be made for its advantages, if not for its necessity.

Observation has convinced me that, after closure of the incision, much indifference is frequently evident in the placing of the dressings and their retention. After abdominal operations, for example, adhesive straps are often laid carelessly across the wound, over the dressing, with no thought as to direction or tension. The thought may be entertained that the abdomen will "swell up" to the straps, or that the dressing will maintain itself without intentional arrangement. Too often the retaining straps are so loose as to be uncomfortable, or tight, if at all, in the wrong place. The object of any external retaining material is not merely to hold the dressing in position, but, in addition, to exert firm but comfortable pressure upon the incision and to furnish support for the whole area involved.

To avoid the disadvantage of the routine methods recourse was had to old ideas. It was first found that purposeful pressure cannot be secured over a rounded surface by long straps; the short strap only can produce the correct leverage. Furthermore, to obtain support for the abdomen pressure should be applied not only from side to side, but also both from below, upward and from above downward—a drawing together from all directions instead of a spreading out flatwise.

Consequently, a pressure-dressing was devised particularly for application after abdominal operations. It consists, first, of a short and narrow dressing of gauze, heaped up 4 or 5 times to the height of an inch, placed in longitudinal fashion directly over the incision and held in place by

[1] Blair, V. P. Influence of mechanical pressure on wound healing. *Illinois M. J.*, 46:249, 1924.

* From the surgical service of Rex Hospital. Submitted for publication February 28, 1929.

three short adhesive straps 1 inch wide (Fig. 1). Secondly, upon this is placed the ordinary large abdominal dressing of gauze and cotton combined, over which is applied longer and wider (3 inch) adhesive straps in a figure-of-eight style producing what I have designated as the "water-melon slice" dressing (Fig. 2). Since the use of this form of dressing as a constant rule, clean wounds have healed properly and surely; not even a collection of serum has appeared in the incisions, as will be the case in many instances where proper pressure has not been employed.

FIG. 1. Inside dressing, applied with short straps. (This dressing is too wide.)

FIG. 2. "Watermelon slice" outer dressing.

When drainage is necessary it is important that no pressure be placed over the opening, but at one end of the incision, or in the middle if a drain is employed at each end.

The pressure method here suggested is believed to be superior to the plan, once largely in vogue, of tying a piece of glass or metal or wood over the incision by means of stay sutures. Such pressure extends only a very short distance on each side of the line of incision, offers no support, and applies an unyielding mass against a fresh wound.

CATHETERIZATION IN THE MALE*

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BROOKLYN

CATHETERIZATION of the male has so often been followed by serious sequalae that it should be regarded as a surgical procedure and performed as such, so that in the event there should be a complication there can be no criticism or self-reproach. The three basic factors of any catheterization are gentleness, cleanliness and lubrication. A heavy thoughtless hand often makes a simple catheterization difficult.

Rubber catheters should always be the instrument of choice. The smaller the catheter the easier it is for the patient and it is suggested that the maximum efficiency with the least discomfort can be obtained by using sizes 16 to 18 F. Personally I favor the rubber catheter which combines the Coude curve and the olivary tip. These factors eliminate to a great degree the fault of the straight type which has a tendency to hang in the redundant portion of the bulbous urethra.

Silk or gum elastic catheters with Coude tips are the instruments to be used in cases of retention due to obstructive pathology. This type is especially valuable in a urethra which has elastic strictures of medium caliber which ordinarily arrests the passage of the rubber catheter. In prostatic hypertrophy, silk catheters possessing the prostatic curve are more serviceable than those having the Coude tips. In the middle lobe prostatic cases, the Coude tip will oftentimes impinge itself against this lobe, causing trauma with attending hemorrhage. Prostatic cases with retention can ill afford to be traumatized, so always play safe and always use a silk catheter with a prostatic curve, provided a rubber one cannot be passed.

Metal instruments such as metal catheters and tunnel catheters are not for the novice to use. Even in the hands of experts their use is not without danger.

In cases of retention due to impassible strictures in which attempts to pass rubber and gum elastic catheters have failed, one should always remember the whalebone filiform bougie. This is of three types: olivary, angled and twisted. The olivary is used the most but the other types have their followers. In the use of these bougies success is directly proportional to the amount of diligence and patience expended. Should a bougie get by the obstruction and enter the bladder, it should be strapped in place to the shaft of the penis with adhesive tape for twenty-four hours and the patient will get relief in being able to void around it. The further care of this type of case is covered by the dictum: stretch when you can, cut when you must.

The rubber and metallic catheters are prepared by boiling for ten minutes. The silk and whalebone types are best prepared by washing well with soap and water, rinsing well and immersing in a solution of oxycyanide of mercury 1:4000 for ten minutes. Bichloride is not recommended as it is irritating and more toxic.

The patient reclines with the head slightly elevated and the legs separated. The genitalia are thoroughly washed with soap and water, rinsed and covered with gauze saturated with oxycyanide of mercury 1:4000 for five minutes and surrounded with sterile towels. The operator prepares his hands with soap brush and water in the usual fashion for five minutes and after rinsing can use either alcohol or oxycyanide of mercury over them. If sterile gloves are available they should be used. Either side of the patient can be used by the operator. The left hand is used to grasp the penis and this hand

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should never change once it has grasped the organ, leaving the right hand free to manipulate the instruments. The penis is grasped back of the glans between the middle and ring fingers. These two fingers can regulate the lateral pressure necessary to maintain the lubricant once it is injected, as well as make the necessary traction to make the penis taut while the catheter is being introduced. The thumb and index fingers of the same hand are free to part the lips of the meatus preliminary to introduction of the catheter. This refinement of holding the penis is a very valuable addition to one's technique and certainly causes less pain to the patient.

With the right hand, lubrication in the form of sterile mineral oil is then injected into the penis with a small, sterile, blunt-nose urethral syringe. The rubber catheter is then inserted after the lips of the meatus have been parted and as the right hand feeds the catheter, the left hand gradually increases the upward tension on the penis until it is taut, which eliminates the redundant portion of the bulbous urethra by putting it on the stretch. Spasm is often met at the approach of the membraneous urethra. Do not try to force the catheter, but keep a uniform gentle pressure and if it is spasm, the external sphincter muscle will soon relax.

If the retention is a sequelae of acute Neisserian infection, always irrigate the anterior urethra with one of the albuminates of silver previous to the preparation of the patient for catheterization, and in addition use a size 10 to 12°F. rubber catheter.

No urethral instrument should be hurriedly introduced; if slowly and gently passed, muscle spasm is minimized and there will be little pain or trauma. If a soft rubber catheter of medium size cannot be passed, a smaller silk one should be tried. If the case is prostatic, use a silk catheter with a prostatic curve. Should the pathology be an impassible stricture, whalebone bougies should be diligently introduced, one after another, and if successful fastened in situ for twenty-four hours.

Should there be present a small meatus which prevents the introduction of a catheter, a meatotomy should be performed after injecting a few drops of novocaine at the frenum. Care should be observed always to incise in the midline in order to minimize hemorrhage.

Emptying of Cases of Chronic Retention. Never empty a chronically distended bladder at one sitting, because it may cause hemorrhage, shock and anuria, singly or in combination. Decompression has to be slow in order to be safe. The best simple plan is to place a plug in the end of the catheter such as a meat skewer, or oftentimes the end of a pen holder will serve the purpose well, and leave instructions for the attendant to remove two ounces of urine every half hour until the bladder is empty.

Lubrication. This is a basic precept which cannot be passed by saying any lubricant will do. Every drug house puts out a lubricating jelly under a trade name, and recommends it for any type of lubrication. Vaseline is a splendid lubricant, but has a tendency to obliterate the eye of the catheter. The various jellies and vaselines present the same problem, that is to determine if it is evenly distributed throughout the urethra. One does not know, and trauma results if the channel is not properly covered. For this reason it is recommended that some sterile oily liquid be injected into the urethra by a technique hitherto mentioned and one can be more certain of the uniformity of lubrication. It is easier to carry a tube of jelly than a container of oily liquid in your bag, but are you or the patient to be considered?

Instillations. Following catheterization it is always a good plan to leave in the bladder 1 to 2 oz. of a mild antiseptic. The albuminates of silver serve this purpose very well. Septic bladders it is well to lavage with boric acid until the return is clear, previous to instillation.

In postoperative retentions or cases of

bladder atony from any cause, the instillation should be one of an irritating nature. One ounce of silver nitrate in strength of 1:4000 when left in the bladder precipitates silver chloride which is very irritating and stimulates prompt micturition. Glycerine in the same quantity with its hydroscopic qualities is a very irritating drug to the bladder mucous membrane and causes micturition in the most obstinate cases.

Vesical Paracentesis. One cannot close a survey of catheterization completely without a word about vesical paracentesis. When all methods have failed to gain entrance to the bladder per urethra, and the bladder can be outlined suprapubically, one can always relieve a patient temporarily by suprapubic bladder puncture. Textbooks tell what a simple procedure it is to insert a trocar and cannula into the bladder and, after removing the cannula, to thread a small-sized rubber catheter through the trocar, withdraw the trocar and strap the catheter on the abdomen.

This is not an easy procedure and we have found it expedient and most satisfactory to use, instead of the trocar, an 18-gauge spinal-tap needle. In this way the bladder is emptied slowly and the wound is small and there is less chance of extravasation and infection following its use over the trocar. The point of election is in the midline, two fingerbreadths above the pubes, and after shaving the area and preparing the skin with an antiseptic plus the use of either novocaine or ethyl chloride, the needle is inserted in an anterorposterior direction. When the hand feels the loss of resistance the needle is in the bladder. The rate of flow can be regulated by the stylet by placing a small rubber catheter on the end of the needle and allowing the fluid to flow into a container.

INFECTIONS OF THE HAND*

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THIS paper is based upon experiences of eight years spent in charge of the Casualty Department of the Birmingham General Hospital, where about fifty thousand patients are treated annually, a large proportion being cases of infections of the hand. During this same period I had the advantage of carrying out very many examinations under the Workmen's Compensation Act, and so have seen many typical examples of what one may call the end result, and I cannot help being impressed by the very large part played by hand infections in damaging the efficiency of industrial workers in our big cities. Indeed so often does a slight cut or prick lead to a permanently crippled hand that it is surprising what little attention is often paid to these seemingly unimportant injuries by the medical profession on the one hand and those responsible for the working of the Factories Act on the other. Even in some of the larger teaching hospitals, the casualty department is under the charge of a senior house surgeon, who, as a student, was never taught to regard his out-patient dressing as one of the most valuable parts of his training, and, in fact, has often been given but scanty instruction upon what is really an extremely intricate matter. The student, time after time, is impressed with the necessity of early treatment in acute appendicitis, but fails to realize the great advantage of prompt and efficient treatment in the very early stages of a simple infected wound of the hand, and yet the loss of earning capacity to the manual worker may be manifoldly greater in the latter than in the former.

ANATOMICAL RELATIONS

There is, probably, no part of the human frame in which the anatomical relations are more intimate than in the hand, and yet this is often quite overlooked in both diagnosis and treatment; in fact surgery of the infected hand is "anatomy plus common sense." It is impossible in a short paper to go into much detail, but I will first attempt to emphasize a few anatomical points which have particular bearing upon treatment. The hand and fingers are divided into a number of fascial compartments and synovial spaces so distinct from one another that pus may not, at any rate in the early stages, pass easily from one to the other. There is a right and wrong method of opening these spaces and a clear understanding of them is essential so that we know exactly where to incise. The superficial fascia of the dorsum of the hand is loose and thin, but in the palm it is generally well furnished with fat, forming a pad for the protection of vessels and nerves. It is closely adherent to both palmar fascia and skin. The deep fascia of the arm becomes thickened at the wrist to become the anterior annular ligament, which forms a strong membrane binding down the flexor tendons and the median nerve in the carpal tunnel, which is subdivided into two compartments, one occupied by the flexor carpi radialis tendon and the other by the nerve and flexor tendons to the thumb and fingers. As one would expect, the flexor carpi radialis tendon has a separate synovial sheath, as has also the flexor longus pollicis tendon, although it lies in the same fascial compartment as the remainder of the flexor tendons to the fingers, which are themselves enclosed in a common sheath. The palmar fascia is a thick triangular membrane, with its apex continuous with the anterior annular ligament and ending below by dividing into four slips, each of which ends at the base of the finger by

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dividing into two further slips, which become continuous with the lateral sides of the digital sheaths, which are tubular envelopes enclosing the flexor tendons in the fingers. They consist of strong fibrous sheaths attached on either side to the phalanges, and are lined by synovial membrane, which also covers the tendons. The sheaths enclosing the flexor longus pollicis tendon and the flexor tendon to the little finger are usually continuous with the larger sheaths beneath the anterior annular ligament, but those enclosing the flexor tendons of the first, second and third fingers extend into the palm for only a short distance. This anatomy of the synovial sheaths is so elementary that I must ask forgiveness for mentioning it, but it is surprising how often it is forgotten by students.

There are, however, other spaces in the hand which are almost of equal importance, and which have been so carefully worked out by Kanavel. Surgeons accustomed to dealing with large numbers of cases of infected hand have, of course, realized that a collection of pus can remain localized in certain parts of the hand for a considerable period without spreading to other parts, but without realizing exactly why this is the case. And yet how accepted is the fact of spread of suppuration along other fascial spaces of the body, as for instance in the case of a psoas abscess! The structures of the palm are divided into three spaces by the fascia and the key to the situation lies in the origin of the adductor obliquus pollicis and the adductor transversus pollicis. These muscles lie deep in the palm, the former taking its origin from the os magnum and bases of the first and second metacarpal bones and the latter from the shaft of the second metacarpal bone, that is, in both cases deep in the palm beneath the flexor tendons. These muscles are covered by fascia extending deep into the palm, and this forms what is known as the thenar space. The muscles of the hypothenar eminence are also enclosed in an envelope of fascia, and this space takes the name of the hypothenar space. Between these two spaces lies the palmar space, roofed in by the dense palmar fascia, separated by quite dense fascia on the one side from the thenar space and on the other from the hypothenar space. Above, this space is continuous beneath the annular ligament with the fascial spaces containing the flexor tendons in the forearm, while below there are further openings to give exit to the flexor tendons, the lumbrical muscles and the digital vessels and nerves. It was pointed out that the synovial sheaths in the fingers extend into the palm for only a short distance, but it is the proximal ends of these sheaths that are intimately related to the palmar space.

Before we leave the fascial spaces in the hand it is worth remembering that the subcutaneous tissue of the dorsum of the hand, unlike that of the palm, is lax, but beneath this the extensor tendons are enclosed in a layer of fascia, and it is into these tendons that the lumbrical muscles are inserted. The density of the palmar fascia is so commonly given as the explanation of the edema of the dorsum of the hand in the presence of a palmar abscess that the other fact that the lymphatics of the palm run backwards to join the main trunks on the back of the hand is often forgotten. I cannot but think that if these few elementary anatomical facts were more widely appreciated by those called upon to treat the infected hand one would see far less crippled hands and far fewer amputations of stiff fingers, because the ultimate result must depend upon early and accurate diagnosis of the site of the pus, and that all one has to do is to apply the ordinary principles of surgery, respecting anatomical details and foreseeing the probable paths in the spread of the infection. One can recall case after case where ill-conceived and inadequate incisions, often without finding pus, have been made, and in spite of such the sepsis has continued to spread.

GENERAL TREATMENT

I will now pass on to a few remarks regarding the general principles of treatment.

It will be easily appreciated that the first essential in treating infected conditions of the hand is an accurate diagnosis of the situation of the pus. In the majority of cases this is clear when one first sees the case, but when in doubt I do not hesitate to wait for twenty-four or forty-eight hours. It is important to remember that the position of the pus does not necessarily coincide with the maximum degree of swelling, but the point of maximum tenderness is a valuable guide. Edema of the tissues should be carefully distinguished from induration secondary to inflammation. The incision should be a free and adequate one; the majority of primary incisions are, in my experience, far too small and easily become closed. Every pocket should be carefully opened up and any arterial bleeding secured by ligature. Local anesthesia (ethyl chloride), the frequent request of the patient so often acceded to by the practitioner, cannot be too strongly deprecated, except in quite small superficial localized subcuticular infections, for one never knows the extent of the incision with certainty until the pus is found. Novocaine, or any other form of injection anesthesia, must not be used in the presence of infection, there being a real danger of spreading the infection and further devitalizing the already damaged tissues. The wound should be left freely open, and personally I prefer to pack fairly firmly with gauze soaked in flavine, and this should be left in until the next day. The packing will stop all venous bleeding, but even more important, convert the incision into an open cavity and so avoid the tendency for it to close up. Drainage tubes are seldom necessary, and indeed seldom indicated. Occasionally glove drainage combined with packing is useful when through-and-through incisions are indicated, as for instance when the palmar space and lumbrical spaces have to be opened up. It is the practice of certain surgeons, in addition to opening up the collection of pus, to incise freely into the edematous tissue in order, according to them, to relieve the tension. It is a common experience to see the results of such incisions having been made into the dorsum of the hand at the time when no actual pus was present. In a few days suppuration has resulted, which eventually heals, fixing the extensor tendons firmly in scar tissue and leaving the patient's hand crippled permanently for life. Except perhaps in cellulitis of the hand (and even then it is a dubious matter) it is unwise to make incisions other than to give free drainage to pus.

Next in importance to efficient drainage is absolute rest in an optimum position of function. I feel very strongly that all infected hands and fingers should be put on a splint, and kept there until active inflammation has subsided. Rest, and in many cases elevation, add much to the comfort of the patient, but in addition have a definite therapeutic value. He whose lot it has been to attempt to get fingers, which are stiff in the fully extended position, into a more useful one, nearly always with disappointing results, will not hesitate to condemn the prolonged use of the straight splint for hand and fingers. It must also be remembered that the thumb must never be allowed to become contracted in towards the palm. After the first twenty-four hours following operation, the local treatment should consist mainly of frequent hot moist dressings and periodic baths in the more serious cases. I have tried many forms of dressings, but have come to the conclusion that, at any rate during the stage of active inflammation, it is the action of the heat that does most, rather than that of the chemical reagents. I believe that for baths hot sterile water is just as valuable as saline solutions, hypertonic or ordinary, eusol, iodine or anything else. Frequently

I have seen skin eruption which subsequently became infected following the use of iodine baths of quite low strength. In actual practice I use ordinary boracic acid fomentations or gamgee tissue, wrung out in boracic lotion, covered by some form of mackintosh and wool. One should be careful not to allow the skin to become too sodden, discarding the waterproof covering for a dressing or two, or a spirit dressing as a variant is useful. I remember Jordan Lloyd deprecating, nearly twenty years ago, the squeezing of and around infected wounds, and still how often we see it done, often with results quite the reverse of that desired. When once active inflammation is under control the hot dressing should be discontinued, as well as the baths, and ordinary wet dressings (personally I like eusol) commenced. Flavine and potassium permanganate are useful in clearing up very septic wounds, but flavine I think delays healing. When we are quite satisfied that active inflammation has settled down, gradual active movements should be commenced with caution.

I have not been sufficiently impressed by Bier's hyperemic treatment to feel that its use is to be commended. Polyvalent antiscarlatinal serum (and I have recently been told that the antitoxin is better, although I have no experience with it myself) should always be tried in the acute streptococcal infections. It appears to have little effect upon the local lesion, but frequently affects the general condition very beneficially, the temperature often falling in a most dramatic fashion. On occasions I have thought that the intravenous or intramuscular injection of some colloids, such as manganese and iodine, have helped to clear up sepsis, especially when there has been a tendency for it to become chronic. The patient's general condition should not be forgotten. The bowels must be kept freely open and plenty of fluid given during the active stage, and I am particularly attracted by the internal administration of liquor ferri perchloridi.

SPECIAL INFECTIONS

I will now briefly describe a few of the special types of infection of the hand and fingers. The simple cuticular whitlow, resulting from a prick or an infected blister, is easily dealt with by cutting away the whole of the raised epithelium. It must not be forgotten that an abscess of this type, of the finger tip, may quite easily lead to bone necrosis as a result of lymphatic infection. Subcutaneous whitlows of the distal section of the finger are very prone to result in necrosis of the phalanx, quite apart from those actually starting as subperiosteal whitlows. The prick may be so superficial as not to be remembered by the patient. It is interesting to note how nearly always an epiphyseal end of the terminal phalanx remains when "apparently" the whole phalanx is discharged or removed.

Especially important in conservative treatment is the case of the thumb, where length is of great importance. I frequently see a large portion of bone, which has appeared to be the whole of the distal phalanx, discharged, yet the patient has finished up with quite a useful portion of the distal phalanx and a movable interphalangeal joint. Prolonged incapacity is often spared by the early treatment of a paronychia. It will be recalled that the greater part of each lateral border of the nail is overlapped by a fold of skin, and it is beneath this that suppuration commences. It soon travels around the nail and before very long gets under the edge of the nail, separating it from the matrix. The nail root covered by the eponychium easily becomes detached from the nail bed. Surgeons are, with increasing frequency, dealing with these cases by making a longitudinal incision along the edge of the nail, carefully pushing back the overhanging cuticle, cutting away the portion of the nail raised from its bed and leaving the distal portion intact. This may scientifically be a better operation than the older one of removal of the whole nail, but there is a danger of being too conservative and

it is not an uncommon thing, even in expert hands, to have repeated operations for removal of further portions of the nail under which suppuration has spread. Personally, I am not at all sure that the radical removal of the whole nail is not the safest and surest procedure. It is equally important after removal of the whole of a nail to keep the eponychium packed back for a few days. This latter operation has, I think, a more general application, and I doubt if incapacity is any more prolonged.

Probably the most disabling infection of the hand is due to involvement of the tendon sheaths. Sufficient has already been said to appreciate that although the synovial sheaths of the thumb and little finger are usually alone in their direct communication with the larger bursae under the annular ligament leading into the forearm, the blind proximal ends of the sheaths of the remaining fingers butt into the palmar space and so pus, by bursting into this space, may not only infect other sheaths but pass along the lumbrical spaces and give rise to widespread infection. It is therefore important to diagnose and treat infections of the thecae early, and again it cannot be too strongly emphasized how possible it is to get a whitlow of this type without a penetrating wound to the sheath. The pus which spreads along the sheath as far as it extends is under considerable tension, giving rise to considerable pain and often marked constitutional disturbances. The finger is edematous and tenderness is present along the course of the tendon, while the finger is held rigid in the semiflexed position. Active movements are absent, and any passive attempt gives rise to severe pain. The sheath should be opened up freely along the lateral side of the finger and in front of the digital vessels and nerves. When possible, however, the sheath just over the joints is preserved, but even this must be sacrificed if one is not certain that it in any way interferes with free drainage. If it has already extended into the palmar space the incision should be carried freely into the palm. It may also have extended along the lumbrical spaces of the dorsum of the hand, when an incision just between the cleft of the fingers of the back of the hand is essential. I have often seen infection in a blister at the base of a finger spreading to the underlying tendon and quickly passing along the lumbrical space to the back of the hand. An incision into the sheath and another into the back, opening up the lumbrical space, rapidly clears up the trouble. It is important to remember that both the thenar and palmar spaces may be secondarily infected from the index finger, while the palmar space may follow suppuration of the sheaths of the second or third, and less frequently the little finger. It is not usual to find the hypothenar space involved except by direct infection through the skin, and then it remains localized.

I have thus attempted in a very brief way to emphasize some of the more important principles in treatment of a subject which does not, I venture to say, receive in the ordinary way the consideration that it deserves. Just as the ordinary cold in the head damages most sensibly the efficiency of thousands of working people every day and often opens up the way to further indisposition, so does the simple injury to the hand, if neglected, often bring serious trouble into industrial life. A small infection, if not efficiently treated, may result in the loss of many working hours, maybe in permanent disability and prolonged and costly litigation, for it is a truism to remark that to the manual worker a perfect hand is as important as a perfect brain.

PARONYCHIA & FELONS*

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WITH the popularization of the many and assorted steel instruments for the "better care" of the nails, paronychia or run-around is a frequently encountered lesion of the distal phalanx of the fingers. Improper removal of the lateral outgrowth of the thin edge of the nail, the so-called hangnail, often causes a break in the continuity of the skin, thus permitting or inviting invasion of microorganisms.

The common types of invading organisms in their order of frequency are: the Staphlococci aureus and albus, the streptococcus, and mixed infections from the human mouth. Rarer infections such as pneumococcus, diphtheria bacillus, gonococcus, blastomyces[1] and tubercle bacillus[2] have been reported, the last two mentioned being of great chronicity.

Following the inoculation there usually appears a red area at the distal part of the nail fold followed by swelling and tenderness. This may subside with or without suppuration, remain local or extend backward along the under surface of the nail edge. In the former instance, when the infection remains local, the worst that will happen will be a small abscess formation which has for its uppermost covering a firm, insensitive, thick skin. The treatment is the simple paring away of this thick skin with evacuation of the pus. A cure follows very quickly without any residual disturbing scar.

In case the swelling increases and the redness extends along the nail fold, a true run-around is forming. Untreated the infection spreads along the subungual space at the free border of the nail until it reaches the root of the nail situated over the matrix. The attachment of the nail at this point is less firm than the anterior part, so the entire nail root is lifted from its bed, the pus finally breaking through to the exterior from beneath the cuticle. The anterior closed space is almost never involved because of the unlikelihood of the organism invading the very dense barrier of connective tissue situated in the floor of the nail sulcus.

The surgical treatment is early intervention, preferably under gas anesthesia, but in case a general anesthetic is contraindicated the digital nerves can be blocked at the proximal part of the finger. Two incisions are made (Fig. 1) beginning in the nail groove and carried backward so that the cuticle is not injured. The flap thus formed is dissected upward, exposing the nail root (Fig. 2). One blade of a sharp-pointed pair of scissors is carefully inserted beneath the detached nail root and the base of the nail trimmed away. A small gauze pack is placed loosely into the operated area and the flap brought back into position. (Fig. 3.) About twelve to twenty-four hours after the removal of the base of the nail, the entire hand should be soaked in a warm boric acid solution for two to three hours, every six hours. The dressing should be changed daily but the gauze pack should not be removed until the end of forty-eight to sixty hours. It is not necessary in the average case to re-insert a pack but the wound should be cleansed daily with hydrogen peroxide and washed with saline or boric acid. After four or five days the soaking can be discontinued and dry dressings applied with a small amount of sterile vaseline to prevent the dressing sticking to the wound.

There are several points to bear in mind with reference to the matrix, because upon the care and thought given to this structure depends the growth of a new nail and a satisfactory end-result. First, delayed treatment will often injure the matrix to

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such an extent that the new nail will be thick, rough and unsightly. Second, when the flap is turned down there should lead directly into the outer surface of the bone, separating the space into compartments containing fat. The periosteum,

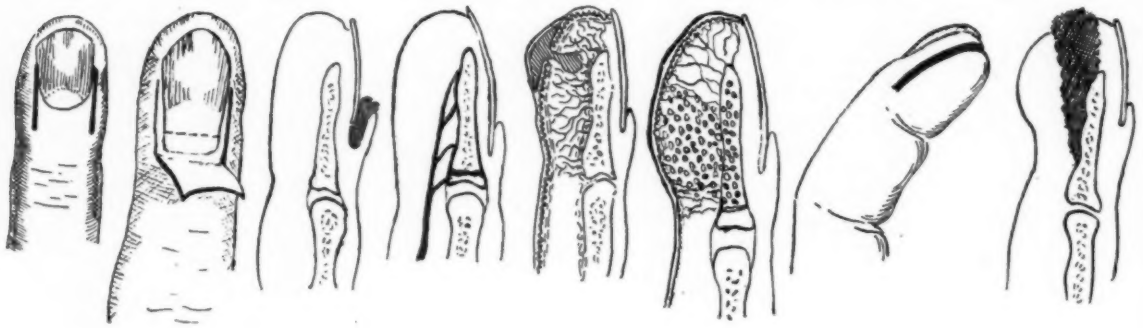

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Fig. 1. Paronychia. Site of incisions to avoid injury to cuticle and matrix.
Fig. 2. Paronychia. Exposure of nail root. Area proximal to dotted line to be removed.
Fig. 3. Paronychia. Gauze pack in place.
Fig. 4. Blood supply to epiphysis and diaphysis. Note epiphyseal branch does not traverse anterior closed space.
Fig. 5. Typical collar-button abscess.
Fig. 6. Mode of invasion and involvement of phalanx.
Fig. 7. So-called fish-mouth incision (about two-thirds shown).
Fig. 8. Method of establishing bone drainage without dealing directly with bone. Gauze pack in place.

be a good exposure of the nail root so that when the base is removed for proper drainage no damage is done to the matrix, thereby avoiding the possibility of a split nail. Third, the cavity should not be packed too firmly with gauze for fear of disturbing the circulation in the matrix.

We do not advocate that the radical procedure be carried out in all instances as the surgeon must judge for himself how much involvement is present, but the entire roof of the abscess cavity must be removed or secondary operation will be necessary.

FELONS

Felon, bone felon, painful whitlow or the more recent and descriptive term, anterior closed space infection, is an infection of the fat pad of the distal palmar surface of the finger, frequently accompanied by osteomyelitis limited to the bone of this phalanx.

In order to understand why an infection of the distal anterior closed space is usually limited to this space and so frequently associated with osteomyelitis of the distal phalanx, one must have a knowledge of the anatomy of the part. From just beneath the thick skin, dense connective tissue septa particularly in the adult, is firmly attached to the irregular surface of bone by periosteal prolongations. The branches of the digital arteries, which are small and widely scattered, traverse these compartments, many entering the bone to anastomose with the circulation of this structure. The blood supply of the epiphysis is a small branch from the digital artery which does not traverse the anterior closed space (Fig. 4).

When the continuity of the skin is broken by a sharp penetrating object, a small cut, a bruise or a mild crushing injury, an avenue for entrance of microorganisms is opened. The common invading bacteria being, as in paronychia, Staphlococci aureus and albus, streptococcus and the mixed infection from the human mouth.

Following the accidental inoculation (about twelve to thirty-six hours) the patient feels as if there were a "splinter in the finger." This discomfort increases in severity, rapidly becoming throbbing in character. In case the infection is rather superficial and the organism is not too virulent, continuous hot soaking, by bringing more blood to the part, may arrest the condition without suppuration. In the

event one of the fatty, relatively avascular compartments is involved, the process may remain local to one or two compartments, thereby resulting in a small subcutaneous abscess which may communicate with a visible subepithelial pustule, the collar-button abscess (Fig. 5). Most often, however, when once the infection has been introduced the cellulitis, hemmed in by the tough skin and the dense connective tissue septa, spreads inward toward the bone (Fig. 6). The swelling increases, the finger becoming more tense until a point is reached where the pressure without the arteries is the same or greater than within. Circulation is impeded, thrombosis follows and necrosis is the end result. The diaphysis of the bone thus becomes involved most likely by direct extension through the arterial channels.

Following one or two sleepless nights and the application of varied concoctions advocated by the family, friends and the corner druggist, the patient comes to the physician, who too often is conservative, thereby allowing sufficient interval for invasion, if not the destruction, of bone. When this clinical picture presents itself, there is but one course, wide incision (Fig. 7) without rongeuring or curetting the bone. Even at a later stage of a similar untreated process, when the roentgenogram shows frank bone destruction, the bone should not be disturbed unless a loose sequestrum is present, in which case the sequestrum is removed with as little disturbance to the remaining bone as possible. The reason for this, especially in the adult, is that by rongeuring away the diseased bone, the periosteum, which cannot be separated, will also be destroyed.

Following incision, which is preferably done under gas anesthesia, the wound is packed with gauze (Fig. 8) and after about twelve hours continuous warm boric acid wet dressings applied to the entire hand. The gauze pack is left in place for two days at which time it will come away without very much pain. The outer dressings, however, should be changed daily. After this forty-eight hour period of moist heat, it is well to alternate every three or four hours, warm wet dressings and some type of dry heat, to avoid maceration of the skin. The wound should be kept open with a light gauze pack until granulations appear at the base, the ordinary surgical care being used to insure proper epithelization. In case there is sequestration, the dead segment of bone will find its way through the open wound.

When end result is to be expected from a properly treated felon with bone involvement? In a child, sequestration of the diaphysis is early and complete; therefore when the usual incision is made, this segment of bone is frequently found lying free in a pool of pus. A perfectly formed distal phalanx will regenerate within a period of two to four months.

In an adult, sequestration is seldom so complete, probably due to the fact that the periosteum is more adherent, and the blood supply is not suddenly and completely interrupted when the infection invades the medullary cavity. However, by early drainage even though the roentgen ray shows extensive bone involvement, resolution takes place with but little if any discharge of bone and a fairly sized and useful phalanx reforms.

In some instances there is a prolonged discharge which often results in an adherent and tender scar or a broad and troublesome cleft. This can be excised with accurate approximation of the skin edges in hopes of obtaining a smooth surface.

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INFECTIONS OF THE BREAST*

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FORMERLY acute infections of the breast were very prevalent after childbirth, and frequently in a severe form. Fortunately, specializing in obstetrics, a better control of midwives, and more attention paid to cleanliness and common sense have all combined to make such occurrences comparatively rare. And yet it must be borne in mind that carelessness and failure to look after details may at any time lead to serious infections and even deep suppurations.

As in all surgical affections, low resistance is a predisposing cause, and should be avoided by appropriate handling of the patient during pregnancy and after the birth of the baby.

The infection practically always enters through the nipple by way of the milk duct or lymphatics, and is usually due to staphylococci, though other and more dangerous germs may be present. Such infection is carried on the hands of patient or attendant, from unclean things and from diseased conditions of mother or baby.

If the baby has any ulcers of the mouth, a nipple shield must be used.

During the last few weeks of pregnancy, in addition to strict attention to the general health, the breasts must be bathed frequently and supported if need be, and the nipples made soft by the daily application of sterile lanolin. If the nipples are depressed they must be gently pulled out. They should also be kept covered with soft clean gauze or cotton.

After confinement, until the milk begins to come, the baby should be put to the breasts infrequently, the baby's mouth wiped out before and after each nursing with sterile water, and the nipples with the same, the breasts being kept covered with sterile gauze. Rubbing or pumping of the breasts, when necessary, must be done with gentleness and strict attention to cleanliness. This sterile cleansing of the nipples and baby's mouth should be continued indefinitely.

Frequently it is difficult to get the milk to start and the breasts become distended, hard and painful (so-called "caked breasts"). This condition is not an infection and can usually be relieved by careful pumping and moist applications. A most effective application is made with liquor Burowii[1] (acetate of aluminum), one part to six parts water, used with moist gauze and protective, such as oiled muslin or waxed paper, and changed frequently.

If the nipples become cracked or ulcerated, nitrate of silver, 10 per cent solution, should be applied and the breasts used less frequently.

At no time should the baby be allowed to hold the nipple in the mouth after the completion of nursing.

Infection of the breast shows itself by swelling, pain, fever and at times a chill. There is also acute tenderness, usually localized. The peculiar anatomy of the breast, and its condition during lactation, makes it easy for infection to spread rapidly.

The same wet dressing, frequently changed, with a tight binder, together with gentle pumpings of the breast and the application of an ice bag, will frequently relieve the condition, or aid in the localizing of the pus.

If an abscess is inevitable, it will show itself by localized tenderness, and should

[1] Formula for liquor Burowii:

Acetate of lead	7 gm.
Sulphate of alum	20 gm.
Distilled water	220 gm.

This is allowed to stand for two hours. Chemical reaction takes place, resulting in a solution of acetate of aluminum, sulphate of lead being precipitated. Thorough filtering is required to get rid of the latter.

* Submitted for publication March 4, 1929.

be opened promptly even before fluctuation is distinct. Small abscesses usually form superficially, frequently under the areolar around the nipple from dilated milk ducts and should be freely incised, by radiating incision, using local anesthesia or nitrous oxide oxygen if available. The cavities should be wiped out with mercurochrome and freely drained with rubber dam.

All incisions into the breast gland should be in a direction radiating from the nipple so as to avoid as far as possible injuring the milk ducts.

A wet dressing of 1 per cent carbolic gauze with protective, and a large padding of cell cotton over the whole, followed by a very tight binder or bandage, will usually prevent the spread of the infection. A daily antiseptic dressing of the wound, with pumping of the breast, as often as necessary, will bring about prompt healing. It is, of course, best not to put the baby to an infected breast.

Deep abscesses of the breast require more vigorous handling. Fortunately, they usually occur in the lower part of the gland. To prevent scars they can often be reached by a curved incision at the lower edge of the breast, the finger inserted and the cavities freely opened by finger dissection. Rubber dam and cigarette drains will provide free drainage and prevent pain at dressings. At times, gauze has to be used to stop bleeding. When this is removed a few whiffs of gas is advisable. Wet dressings with pressure are used here also.

An abscess may form at any part of the breast and may have to be opened at the point of tenderness. Regardless of the after scar, it is then necessary to make a radiating incision with finger dissection, drainage and pressure wet dressings as already described.

Occasionally the surgeon meets with one of the old time cases in which a large part or the whole of the breast is abscessed, and it becomes necessary to make multiple radiating incisions. Such cases were of frequent occurrence years ago, but are rarely seen today. The old treatment, however, still holds good, and brings prompt relief and rapid healing.

Deep radiating incisions are made, the breast thoroughly explored with the finger, and the cavities, after cleansing, are packed full of wet 1 per cent carbolic gauze, with a few layers of wet gauze covering this and then a large soft sea sponge which has been wet in the solution and squeezed out. The whole is covered over with protective and a *tight* bandage applied. As soon as the patient can be propped up a little, the same solution is poured in at the upper edge so as to saturate the sponge and cause increased pressure.

The next day the dressing is changed, the packing being removed, the wounds washed out, and fresh wet gauze applied over the breast, without packing, with a reapplication of the sponge and bandage. At the next dressing a remarkable change is shown, the cavities being practically obliterated and the wound appearing clean.

It usually takes only two or three more such dressings, after which the wounds in the breast are treated as ordinary wounds, the skin being rapidly brought together. It is necessary, however, to keep up sufficient pressure to hold back the formation of milk.

A "wet pressure dressing" is helpful in all abscesses of the breast. Rubber tubes are not advisable. Rubber dam is much more useful.

The breast may be the seat of other forms of infection such as from caries of a rib, traumatic abscess, tuberculosis, or gumma.

NON-OPERATIVE PROCEDURES IN UROLOGY*

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THE remarkable stride which has been made in the development of cystoscopic technique within the last two decades, the better understanding of underlying pathology made possible by the introduction of urography, have tended to conservatism in the management of urological conditions to a degree never known before. Caulk in his presidential address before the American Urological Association laid emphasis on the fact that "in spite of surgical preparedness and surgical efficiency, the striking tendency of urology today is conservatism. Science has reduced urological surgery in the last quarter of a century to a striking degree in spite of the fact that it has given facilities for its advancement . . . Many of the operations have been either restricted or erased from our surgical calendar."

However true the above may be, a word of warning is in order against over-indulgence in conservative manipulations in various obstructed, infected or neoplastic lesions of the urinary tract. A line must be drawn sharply between what constitutes an operative lesion or a condition where cystoscopie measures have a reasonable chance to succeed. This entails a careful study of the case and a correct diagnosis. Too much temporizing with true surgical conditions is the one great danger so commonly seen and which must be avoided.

I shall endeavor briefly to enumerate the various conditions in the urinary tract which may be corrected by the employment of minor surgical procedures in as much as they entail cystoscopic manipulation, touching upon indications and, as much as the space will permit, on technique.

1. *Urethral stones* frequently become lodged either in the anterior or posterior urethra. The presence of an old stricture or a small meatus or a naturally narrow urethra is the factor which prevents the passage of a stone. These stones are usually freely movable and may be made to pass by slitting the urethral meatus and dilatating the urethra with sounds below the stone, supplemented by instillation of sterile olive oil. It is well to compress the urethra by a tourniquet so as to prevent the stone slipping back and after the urethra has been sufficiently dilated the stone may be expressed in a way very similar to the expression of a kernel out of a cherry.

2. *Prostatic stones* ulcerating into the urethra produce very annoying symptoms. These may occasionally be easily liberated by the Collings cutting current applied to the mucosa around the stone so as to enlarge the opening.

3. *Obstructive lesions at the neck of the bladder*, such as median bar or contracture of the vesical neck, may be relieved by burrowing a channel through which urine may find an easy exit either by cutting out the obstructive tissue with Young's punch or an employment of Caulk's electric cautery or Collings' technique. The recognition of proper indication is of paramount importance. To subject a case of true prostatic hypertrophy to such palliative procedure as mentioned would be hazardous and because a correct diagnosis may at times be difficult, one must especially be guarded against possible pitfalls.

I have been particularly impressed by the work done by Collings in the removal of the obstructive bar by means of a cutting current under direct vision through the McCarthy panoblique cystoscope in

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that it eliminates to a great extent the element of guesswork incident to other methods and the danger of hemorrhage. For a description of the operation, which is best performed under spinal anesthesia, I would refer the reader to his publication on the subject.

4. *Vesical Calculi.* Ureteral stones lodged in the bladder or very small calculi may be removed by forceps introduced through an operating cystoscope. The same is applied to the removal of small foreign bodies such as broken off pieces of catheters, hair pins, etc. The technique is very simple and does not require spinal or general anesthesia. For larger stones, measuring from 10 to 15 mm. in length, I know of no better instrument than Young's rongeur (a forceps built along the lines of a cystoscope). Although the instrument is not built for crushing hard calculi, occasionally much larger stones (20 to 30 mm.) of softer consistency may be crushed and removed piecemeal by the rongeur.

Primary vesical calculi not associated with obstructive lesion at the neck of the bladder are rare both in the male and in the female. Any attempt to remove secondary calculi, even if such are of small size, by cystoscopic means should be regarded as a useless procedure unless the primary obstructive lesion at the neck of the bladder, such as an adenomatous hypertrophy, is corrected. Occasionally one sees large vesical calculi with no obstructive lesion at the neck of the bladder or in the urethra and in such cases the more powerful lithotrites are indicated. These crushing instruments, devised by Lowsley, McCarthy, Joseph and Ravich, are built along the lines of the old Bigelow lithotrite but are provided with lenses and a lamp so that crushing is done under vision. I am particularly acquainted with the Ravich lithotrite and on one occasion I was able to crush with his instrument a stone measuring 29 by 35 mm. (Fig. 1). The crushing should be done under spinal anesthesia and the fragments are removed by a suction pump. Frequently the larger fragments may necessitate the introduction of the Young's rongeur for their removal.

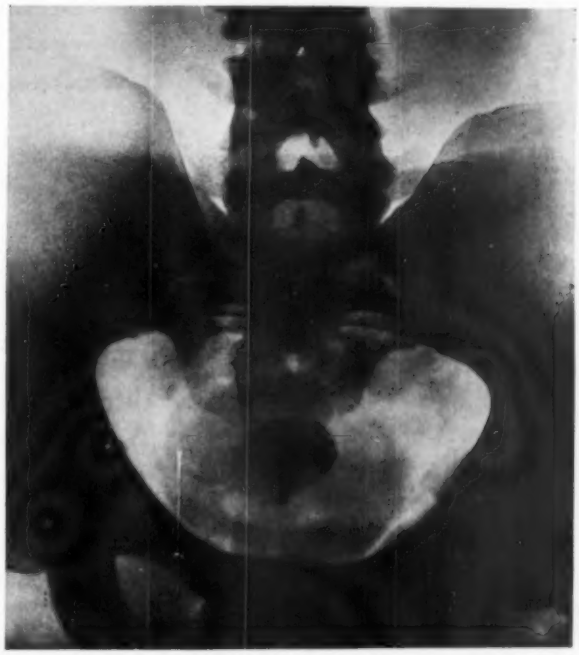

Fig. 1. Large vesical calculus measuring 29 × 35 mm. crushed under direct vision by Ravich lithotrite.

5. *Vesical Neoplasms.* The epochal introduction of the high frequency current (bipolar or unipolar) by Beer in the treatment of benign vesical growths constitutes one of the greatest advances that has placed urology at its present high degree of efficiency. The proper recognition of the type of growth is essential either by its cystoscopic appearance or by removal of a piece of the growth (through the cystoscope) for a microscopical examination. It cannot be too strongly emphasized that the use of fulgurating current applied to malignant lesions is of no avail. As the proper recognition of this type of tumor may at times be difficult this method of therapy should be abandoned once it becomes evident after a few trials that it has not resulted either in diminution or total disappearance of the growth.

The important point to bear in mind in the treatment of vesical tumors by means of fulguration is that the current

should be applied as near the base of the growth as is mechanically possible.

In malignant as well as benign growths of the bladder complete disappearance of the tumor may be occasionally noted with the use of radium therapy. The tumor may be irradiated either with the whole element introduced into the bladder by means of a special forceps or with implantation of radium emanation seeds. Here again it is essential to implant the seeds as near the base as possible. Because of the unfavorable position of the tumor, it is often a matter of mechanical impossibility to secure the proper introduction of the seeds through the cystoscopic route and the nearer the growth is to the neck of the bladder the greater is the difficulty, because even with the best deflection of the radium-containing implanter, it is often impossible to guide it into the base of the growth. In such cases an open operation should unhesitatingly be resorted to even if nothing else is contemplated than the introduction of seeds. Recently the author had implanted radium emanation seeds into the tumor at the neck of the bladder through the anterior wall of the bladder through which the growth was distinctly palpable.

Fig. 2. Author's rubber bags used in dilatation of ureter, before and after inflation. Note that lower rubber bag has filiform tip which facilitates passage into ureter.

6. *Ureteral Stones.* It is in this field of urology that the application of mechanical devices coupled with a better understanding of the regulating forces and compensating mechanism incident to calculous obstruction has resulted in possibly the greatest reduction of major surgical operations. The presence of a stone in the ureter, even for many weeks and months, may inflict either no damage at all to the kidney, or too slight a damage to be of any serious consequence because of the linear grooves (channelization by urine) on calculi, which permit a more or less free drainage. These grooves were observed by the author in 34 per cent in his series of 424 cases. The so-called mulberry calculi, or those studded with spiculi, owe their configuration to the urine burrowing its way to the bladder all over the surface of the stone and are not included in estimating the percentage in the figures just mentioned. This protective mechanism constitutes the basis for conservatism in the management of ureteral stones as the latter may be allowed to remain in the ureter with reasonable safety for a considerable period of time, before considering a major surgical interference, with the hope that they may be brought down by cystoscopic means.

Here again a word of warning is in place against too much temporizing with cases which clearly present a major surgical problem, such as acute fulminating renal infections resulting from obstruction below, where calculi are too large, in cases of bilateral impaction or reflex calculous anuria with impending uremia in which cystoscopic interference failed to produce immediate re-establishment of renal drainage and finally, when repeated cystoscopic attempts to bring down the stone proved to be futile.

The aims sought by cystoscopy are: (1) to establish renal drainage by breaking up the impaction. This is best accomplished by one or more catheters left indwelling, after one succeeds in passing them by the obstructing stone. (2) To combat renal infection. (3) To bring immediate relief to the patient seen during an acute attack of renal colic by draining off by means of a catheter the urine trapped above the

obstructing stone. (4) To facilitate the downward passage of the stone. Even if the last-named object is not forthcoming, a great deal is accomplished in the way of saving a kidney by catheter drainage as a temporary procedure before surgical interference for the removal of the stone is resorted to.

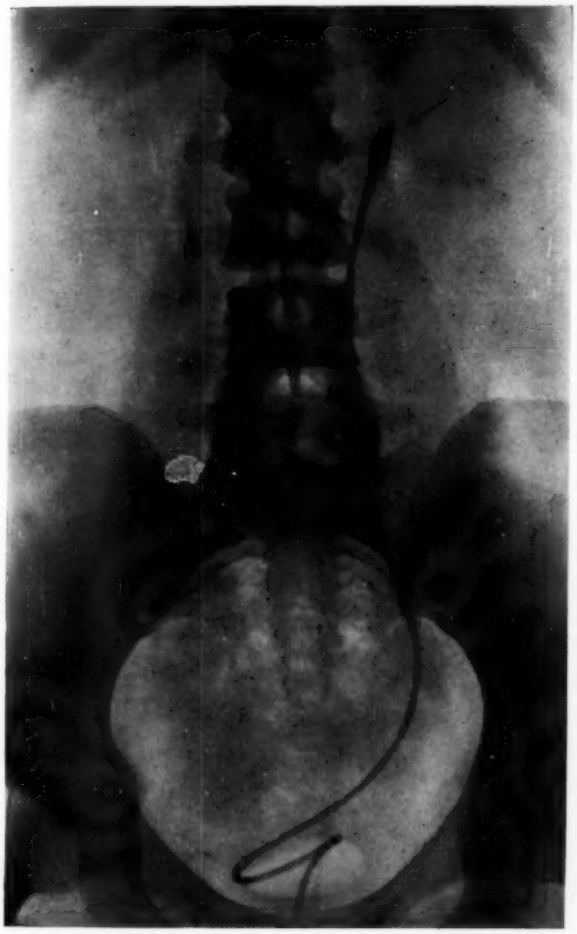

Fig. 3. Stone in upper portion of left ureter with inflated rubber bag just below it. Arrow indicates position of stone.

There are two groups of cases which one is called upon to treat: (*a*) acute cases; (*b*) chronic cases.

a. Acute Cases. In this group calculi are as a rule small and their expulsion may be facilitated by the use of catheters (passed by the stone) which should be left indwelling anywhere from two hours to several days. Occasionally a small stone may block the intramural portion of the ureter, producing such an enormous edema of the mound as to render intraureteral manipulation impossible. In such instances the light application of a high frequency spark to the edematous mass will result in the abatement of the edema and the release of the stone.

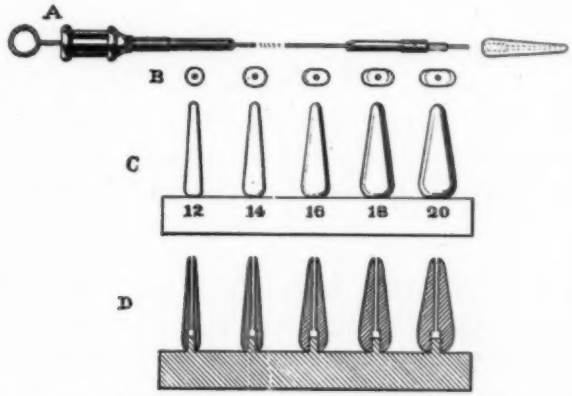

Fig. 4. *a.* Author's tunnelled bougies and catheter.
b. Cross section of tunnelled bougie at proximal end.
c. Various sizes of tunneled bougie screwed into bar.
d. Vertical section of tunneled bougie.

b. Chronic Cases. Here we have a history of repeated attacks of renal colic extending over a considerable period of time. The stone is as a rule large, is frequently grooved and is found in the majority of cases in the lower end of the ureter. The attacks of pain I believe are due to the clogging of the groove by urinary sediment, producing sudden retention. The expulsion of the stone in such cases may be facilitated by: (1) The breaking-up of the impaction by indwelling catheters or filiform bougies as in acute cases; (2) dilatation of the ureter below the stone, to a degree at least equal to the width of the stone.

Before ureteral dilatation is attempted it may be necessary to enlarge a congenitally small orifice by slitting it with scissors. The employment of a fulgurating spark for this purpose I believe is harmful, as the resulting scarification may produce complete ureteral block.

Dilatation of the ureter below the stone may be produced by rubber bags (Fig. 2) inflated with water, a method introduced

by the author three years ago. The extent of dilatation may be well ascertained by roentgenogram when an opaque solution, such as sodium iodide, is used for inflation (Fig. 3). When stones are situated just above the intramural portion of the ureter the use of the Bransford Lewis dilator, the Buerger olive bougies or the author's tunneled bougies (Fig. 4), which may be employed in conjunction with the instillation of hot olive oil, should be resorted to. It is difficult to dilate the intramural portion of the ureter with rubber bags because most of the inflation will take place within the bladder (that is, in the line of least resistance).

In some instances large calculi situated in the intramural portion of the ureter may be made to pass into the bladder by a linear incision with a fulgurating spark directed over the stone. The orifice should be carefully watched subsequently and if need be it should be kept dilated.

I feel that any device calculated to bring down the stone by force (unless the stone is seen to protrude from the orifice) is pregnant with dangerous possibilities and should not be employed.

The degree of success expected from cystoscopic manipulation, aside from the size of the stone or other factors already mentioned, depends largely upon the location of the calculus. In my series, 95 per cent of stones lodged in the lower end of the ureter were amenable to removal by cystoscopic manipulation; while the same was true only in 46 per cent of cases when in the upper portion.

7. *Ureteral Stricture.* In my own experience strictures of inflammatory origin with focal infection as described by Hunner were rarely encountered. However, congenital narrowing of the ureteral orifice and of the intramural portion of the ureter is of frequent occurrence, analogous to the stenosis of the meatus so commonly seen in the male urethra. This anatomical defect plays an important rôle in the production of renal calculi, hydroureteronephrosis and renoureteral infections. Correction of such defect by slitting the stenosed orifice with scissors and dilatation of the lower end of the ureter may be well accomplished through the cystoscopic route.

8. *Renal Infections.* Here again it is important to arrive at the correct diagnosis by cystoscopic investigation as well as by clinical study as to what constitutes a "surgical kidney" and simple pelvic infection. The latter, so commonly seen in children and in pregnancy, may be readily combated by pelvic lavage with antiseptic solutions and drainage, after all other methods, when given a fair trial, have failed. The use of a warm solution of silver nitrate (1:400) gives probably the best result. The spectacular drop of temperature and the disappearance of pus and bacteria in the urine so commonly seen even after a single lavage, in pelvic infections which stubbornly resisted all other methods of treatment, is, indeed, very gratifying.

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EPITHELIOMA OF EXTREMITIES*

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THIS study was undertaken at the request of the late Dr. C. A. McWilliams, a few months before he died. On that service we had had several patients with this condition in rapid succession. It so happened that in none of them was there any involvement of the axillary nodes, although they were removed radically in all cases. In some the epitrochlear node was also excised, apparently unnecessarily. In order to find out whether or not fuller statistics would show similar results I went through our records here. As our histories were in very poor condition at that time I subsequently included all of this type of case which had occurred at St. Luke's Hospital since 1897, and a private case of Dr. Schley in which Dr. Wood had examined the specimen. At this time I wish to express my thanks to Dr. Wood, through whose courtesy I was given access to their charts. This report is based on 37 cases.

The question to be determined was whether the condition, which histologically was the malignant type of epithelioma, called variously spinous, prickle or squamous celled, might not clinically behave like the tumor that had been produced in rabbit's ears by Drs. Wood, Rohdenberg and Bullock,[1] and others by painting or injecting them with Scharlach R, pine tar or other irritants. These tumors under the microscope are indistinguishable from the very malignant growths found on the human lip, tongue, vulvar and rectal mucosa. Clinically, however, they behave very differently, growing very slowly, never metastasizing, and disappearing completely and permanently when treated with one erythema dose of roentgen ray, an amount entirely insufficient to have any curative effect on human cancers.

Rohdenberg and Bullock[2] have also produced carcinoma by inserting a ball of bristles in the rat's stomach. However after these balls are removed, and biopsy shows a typical carcinoma, the lesion heals spontaneously in two or three months and autopsy subsequently shows no trace of malignant disease.

The literature on the subject, especially in English, is rather meager. Heidingsfeld[3] in 1900 reported 1 case without mentioning the microscopic findings or the treatment. Muehleck[4] in the *Transactions of the Pathological Society of Philadelphia* gives a short summary of previous articles without adding any particulars. Douglass and Culver[5] of San Francisco in 1915 reported 6 cases, all treated with roentgen ray without pathological examination. Fox[6] in 1915 reports 1 case caused by a horse bite, proved by biopsy, with enlarged axillary nodes, and a roentgen-ray report of pulmonary metastases, but no operation or autopsy. He adds a fairly thorough summary of the literature. McFarland,[7] in January, 1928, cited 1 case treated by roentgen ray and bipolar diathermy with later proved axillary involvement.

The article by R. Volkmann[8] in 1889 was the first thorough study of the subject and in it is stressed the fact that these tumors are invariably of the squamous cell type, but that they are relatively benign clinically, in spite of their histological malignancy. Weilepp[9] says they have the best prognosis of any skin cancer if those originating on warts and moles are excluded. Labiche[10] says there is little tendency for the nodes to be involved. Bouche[11] agrees with this dictum and adds that the untreated cases have an average duration of life of from eight to nine years

* From the Surgical Service of Dr. Franz Torek. Read at annual meeting of Clinical Society of N. Y. Skin and Cancer Hospital, November 23, 1928.

as compared with that of one to two years in histologically similar lip tumors, or with internal cancers.

The condition is undoubtedly rare. Heimann[12] lists 207 cases in 20,544 cases of carcinoma; Gurlt[13] 155 in 3,422; Winiwarter[14] from Billroth's clinic, 9 in 548; v. Bergman 17 in 254; Bulkley and Janeway[15] 2 in 417. At the Skin and Cancer Hospital I found 26 cases out of over 35,000 patients admitted to the hospital. This is undoubtedly too low an incidence as I took no account of any case where there was not a pathological examination. Many patients came in, were diagnosed clinically and then went home refusing operation. In others, due to the very inadequate history system at that time, the pathological record was misplaced. At St. Luke's Hospital in thirty-one years there have been only 9 cases admitted to the wards and subjected to operation, and 6 operated on in the dispensary. In all of these the pathological report was on file in the laboratory but the histories of 5 from the Out Patient Department could not be found, so I have not included them among the cases here reported.

The predisposing causes as stated by Von Brunn[16] fall into three groups, and he states that in his series of 321 cases they were divided as follows:

Group 1. 227 cases; on a basis of chronic inflammatory tissue such as ulcers, scars, fistulae, lupus, osteomyelitis etc.

Group 2. 46 cases; on warts or moles, congenital or late.

Group 3. 48 cases; on apparently normal skin.

Occurrence after a single trauma is rare; Würz[17] states that it occurred in 4.6 per cent of his 174 cases; and prompt appearance thereafter is even rarer. In this series there were 3 cases that gave a history of only one injury without subsequent infection; the earliest of these reported that the lesion appeared eight months later, the others at two and three years. Eleven gave a history of some previous injury. Von Brunn's[16] Group 2 I have eliminated almost completely as they are an entirely different tumor, melano-epitheliomata, and undoubtedly of the most virulent malignancy. I have therefore not considered as properly belonging to the type of tumor under discussion any case in which the pathologist reported the presence of pigmentation. (I really should not make a statement quite so strong as this. In discussing this paper with Dr. Wood he advised me to include no cases in which the original insult to the tissues had been caused by roentgen rays or radium as they "grow like wild fire." It so happened that there was only 1 case in the series that gave such a history. She was treated with roentgen rays for keratosis of the soles in 1901. In 1906 she went to St. Luke's Hospital for epithelioma of the soles of both feet. She was operated upon then on the right foot and six months later on the left. She then disappeared until 1920 when she returned with recurrences on both feet, was reoperated upon, had further return of the condition in 1923, was again operated upon, and has not been heard from since in spite of much effort of the follow-up department.)

These epitheliomata are reported as more common on the leg than on the arm. Von Brunn[16] found 95 out of 368 on the hand. Muehleck[4] states that the proportion is 3:2. Over 50 per cent of those on the lower extremity are on the lower leg, probably because so many of them arise on a varicose ulcer as a base. Over 60 per cent of those on the upper extremity occur on the back of the hand, according to him. Occurrence on the palm is very rare, Von Brunn[16] finding only 2 in 95, Franz[18] only 3 in 74.

In this series only 5 occurred on the lower extremity, all of them on the foot. One each was found on the elbow, the forearm and the wrist, 2 on the fingers, and 27 on the hand. In 14 of these it was specified that the back was involved, in the other 13 the part was not mentioned.

Muehleck[4] says that two-thirds of the cases occur in men, and that over 50 per

cent of them develop between forty and sixty years of age. My figures show only 9 women, an incidence of just under 25 per cent; and a considerably higher age distribution, i.e., 22 cases, approximately 60 per cent, between sixty and eighty years, and an additional 20 per cent between fifty and sixty years. In other words, 80 per cent of the patients have passed the age of fifty years. The youngest patient was thirty-one and the oldest was eighty-two.

Nationality was not noted in any of the series previously reported. I found that 17, or almost 45 per cent, were born in the United States. Of the remainder 50 per cent were Irish, 16 per cent Italian, and one patient from each of five other countries.

The occupation seemed to make very little difference, the most common one being "housewife" of which there were 8, including all the women but one, in whose case no occupation was given. Activity was definitely of an outdoor type in 9, indoor in 8 women and 6 men, doubtful in 5 and not given in 9. They included 1 bootblack, 1 laborer, 2 boatmen, 2 masons, 2 farmers and 1 orthopedic surgeon.

The duration of the trouble before coming to operation varied from three weeks to fifteen years. It was under three months in 4, between three and six months in 5, between six months and a year in 7, between one and two years in 7. Only 6 had allowed it to go on longer than this and only 3 had not come for treatment before it was three years old.

Symptoms and appearance are grouped because when terms such as "granulating" and "fungating" appear in the history one wonders how much the house surgeon allowed his eyes to help his ears. With many of the histories either entirely missing or incomplete we find "burning" mentioned once, "itching," "granulating" and "fungating" each twice, "ulcerating" seven times, "pain" six times and the absence of pain specifically noted four times. The physical appearance is described as ulcer nine times, warty, indurated and elevated each six times, cauliflower and nodule each twice, and with a raised edge eight times. Discharge was mentioned eight times, once as absent, once as serosanguineous, twice as watery, and four times as bloody. Any relation to syphilis is not proved, as in 4 cases in which there was a Wassermann report it was negative in all instances.

Four of these patients returned to the hospital of origin with 8 recurrences, making a total of 45 operations. These were described as follows: Excision with Thiersch graft 15, excision with flap 3, excision with primary closure 2, excision with removal of subjacent bone 2, excision with removal of large amount of tissue 3, excision without note as to closure 8, excision, curettement and fulguration 3, excision with full thickness graft 1, and amputation 8. The smallest was a toe, the largest, 4 in. above the knee.

The question of treatment of these patients is an important one. We have two main methods of treating them: surgery and radiation. When I speak of surgery I include removal with the knife, with the so-called radio-knife, diathermy, endothermy, auto-coagulation or whatever you wish to call it. All of these are, or should be, part of the armamentarium of the well equipped surgeon, to be used as his judgment of the exigencies of the case indicate. Radiation, either by radium or roentgen is not satisfactory. Douglass and Culver[5] state that these tumors are more resistant than those of the face; and in this series 5 patients had had previous treatment of this type without success. Unquestionably the best treatment is adequate surgical removal. Cauterization by liquid or paste; or ultraviolet light is of absolutely no value.

Pathologically the series does not bear out the dictum of Volkmann[8] absolutely, although he is in the main correct. Twenty-seven cases were of the prickle cell type, 2 were basal, 1 had a prickle cell on one foot and a basal on the other, and in 7 the

type of cell was not specified. We now come, as we must with all squamous celled cancer, to a consideration of the regional lymph nodes. I have cited 1 case with involvement, and can add 1 more from this series; in which the nodes were removed from 12 patients. Peculiarly enough that case was a basal celled growth but it had been treated with radium. Whether or not this is a case of *post hoc ergo propter hoc* I leave for someone else to decide. Three patients have died to my knowledge; 1 of apoplexy about two years postoperatively, 1, a woman of thirty-nine, about eight months after her first operation and three months after her second, of general internal metastases proved by autopsy. The third, a man of forty-six, two and one half years after operation with an atypical pneumonia which might or might not have been metastatic. Unfortunately no autopsy could be obtained. His nodes did not show involvement at the original operation.

How than are we to treat these patients? Here we have only an 8⅓ per cent involvement of the nodes, in those cases in which they were removed; and a sure 3 per cent and a possible 6 per cent mortality from visceral involvement; both in relatively young patients. We have 1 case which went probably fifteen years and another which went surely seventeen years without evidence of any but local invasion. Shall we then say in all cases, "Let us wait and see whether the nodes become involved later. They rarely do?" Of course if they do we know that the prognosis for permanent cure becomes at once much worse. One case in 12 is a small number but do we wish to take the responsibility of feeling that we might have saved the particular individual who became one of the unfortunate 8 per cent? Shall we make a routine removal in all cases as we do with breast, lip and tongue cancers, with its small but nevertheless definite number of patients who will succumb to the operative trauma? Or can we attempt to use our clinical judgment, and decide from our previous experience which cases will involve the nodes and which will not; endeavoring to steer the patient's ship between the Scylla of metastasis and the Charybdis of operative mortality to the safe harbor of "death from other causes?"

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IMMEDIATE TREATMENT OF INDUSTRIAL TRAUMA*

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NEW YORK

IT is astounding to peruse statistics of industrial accidents and especially to note the number of permanently disabled, and the length of disability from more or less minor traumatic lesions.

The mechanical age, in which machines have to a great extent increased mass production, has added greatly to more distressing disabilities following trauma to careless or inexperienced workers. The larger corporations of the United States have realized the value of preventive measures and have installed devices that tend to lessen accidents. They have appointed efficiency experts whose function it is to oversee the technique of both man and machine. This in itself has not been sufficient, for there is still noted unavoidable trauma. The common procedure, when a man was injured consisted in sending him to the nearest general hospital or doctor, who, in the majority of cases was a young inexperienced general practitioner in need of the small fee collected. It was no wonder that disability was prolonged. Surgeons realize only too well today that early treatment before inflammation has set in will curtail the disability period greatly. The remedy for loss of man power and the time lies with the industrial plant alone. Some of the larger American plants have attempted to correct the time evil by establishing clinics and hospitals directly on the grounds of the works, but unfortunately they have not gone far enough, for frequently one sees a trained nurse or a young general practitioner without hospital experience doing major surgery or through inexperience and haphazard treatment inviting infection and loss of tissue in a very simple injury. How can this be remedied? As is done in New York City I believe the establishment of traumatic hospitals with ambulance service has greatly enhanced the treatment of trauma. These hospitals of course are manned by traumatic surgeons, the interns or house surgeons have already completed general hospital training and have had special courses in industrial surgery. You should not carry away the idea that traumatic surgery differs in principle from surgery in general.

Most general surgeons are interested in the patients' local trauma and fail to consider his general condition. Time is exceedingly valuable in trauma principally due to the complications of shock and hemorrhage which go hand in hand. The surgeon cannot lay down hard and fast rules as to the treatment of a wounded man, but must correlate his power of observation and apply intelligently his scientific knowledge. When he has treated a vast number of traumatopathies he can frequently tell at a glance and by the taking of the pulse whether the patient is suffering from shock or hemorrhage or both. In general the principles of treatment should be:

1. Control the hemorrhage.
2. Allay mental excitement.
3. Preserve body heat.
4. Stimulate circulation.
5. Conserve tissue fluids and combat acidosis.
6. Intervene surgically at the right time.

The actual technique of treatments I shall not mention for they are quite well known. I may state however that I have used with excellent success radiant heat and diathermy to the liver and splanchnic

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areas in cases of shock. Transfusions should not be delayed.

Surgical Procedure. If a patient is deemed a poor risk it is entirely out of the question to perform a complete repair. The surgeon should merely perform that which will preserve life. There are some conditions necessitating immediate surgical intervention, namely:

1. Active hemorrhage from injury to large vessels, including wounds necessitating amputation and penetrating wounds of the abdomen and skull. If one can wait until shock reaction has set in the chances for complete recovery are far greater.

Anesthesia. Ether, chloroform, anesthol and ethyl chloride are strong depressants and the lowering of an already low blood pressure (20 to 30 mm.) may be fatal. Nitrous oxide, oxygen 3 to 1, keeps the patient in analgesia with satisfaction and more safety. Spinal, conductive, regional and local anesthesias are less depressing than ether and chloroform. If gas oxygen is not available an attempt to raise the pressure is essential by means of transfusion or infusion.

Wounds. In the treatment of traumatic wounds the following principles should be observed:

1. Sterilization (chemical and mechanical).
2. Hemostasis.
3. Suture.
4. Drainage.
5. After-treatment.

If there have been any great destruction of tissue and soiling, debridement should be practiced. The wound is prepared by soap, water and peroxide, dried and oily substances removed with benzene or ether. The wound is then irrigated with a solution of boric acid, saline or Dakin's solution if soiling is present. Only dead and dying tissue should be sacrificed. Dissection should be sharp and blood conserved. Unnecessary sponging should be avoided as this irritates tissue. One should attempt to leave a linear scar.

Suture. In clean wounds less than twelve hours old primary suture should be done. Contraindications to primary suture should be:

1. Wounds with great tissue and blood destruction.
2. Fulminating infections.
3. Shock or impending shock.

The one criticism of primary suture is the amount of tissue lost in debriding.

Drainage. Rubber tissue or rubber strips are most efficacious. To the surgeon who is not familiar with primary suture I would suggest delayed primary suture which is to be done within three to five days and which does not add materially to the healing time. Rest to the injured part for two to three days shortens the period of disability greatly. If an extremity is involved, elevation is most important to assist the return flow of blood. Tetanus antitoxin should be given routinely in any case where a punctured wound has resulted from trauma.

Amputations. If there has been marked soft tissue destruction as well as bone destruction with no chance of viability, immediate amputation is essential. If the condition of the patient does not warrant a flap operation a rapid circular should be performed.

Burns. In the treatment of burns the traumatic surgeon should look into the future and the procedure should be determined according to the physical findings. The principles of treatment are:

1. Treat or prevent shock.
2. Care of injured tissue and prevention of infection.
3. Relieve pain.
4. Promote excretions.
5. Stimulate circulation.

The general early treatment is all important, for the severely burned die rapidly from shock. The wound itself should be made painless as rapidly as possible for this symptom adds greatly to the shock. Spraying with novocaine solution, 1 per cent, is most valuable. There are a great many treatments for burns but most traumatic surgeons in America have come

to utilize the old tannic acid method almost exclusively. After the part has been anesthetized and the oily substances removed, a 5 per cent solution of tannic acid is applied and the dressing kept wet. There is complete healing when the tanned surface is extruded. In joint burns it is of paramount importance to prevent contractures by proper splinting.

Dislocations. By far the treatment of choice in reducing dislocations is manipulation under general anesthesia. The sooner the reduction the less time it takes for complete function. There are times when it is difficult to decide whether dislocation is accompanied by fracture. If roentgen-rays are not immediately available treatment by suspension and traction should be carried out. The dislocation is frequently reduced spontaneously when soft tissue has relaxed.

Fractures. In the immediate treatment of fractures we must keep in mind that, as time goes on, the spasm increases as inflammation and hemorrhage ensue with the result that reduction is more difficult to accomplish. Delayed, and non-union is favored by loss of time. The first surgeon on the scene should immediately begin reduction by traction either manually or by means of a Thomas or Jones traction splint. It is surprising how rapidly a marked displacement can be corrected by immediate traction. Every compound fracture should be made a simple one through debridement and suture if the compounding is from without in. If there has been a simple spicule puncture, sterilization and sealing with collodium is done. Every compound fracture should be looked upon with suspicion and tetanus antitoxin administered. Our experience in one of the large traumatic hospitals in New York City has taught us to treat practically all fractures of the humerus, femur, clavicle and scapula by means of suspension and traction in bed. We have brought the worker back to his labor in very much less time than by other immobilization methods. After a week of attempted reduction with failure it is always wise to do an open operation. This is especially true of comminuted spiral fractures, interposition of soft parts, fracture dislocations as well as in fractures of the patella, displaced olecranon and displaced condyles. When plaster of Paris is to be used we find that plaster splints are far superior to the old circular plaster, for the circulation is preserved and often an ischemic paralysis prevented, in case marked swelling ensues. Extremities should be elevated to assist the return flow of blood. In most cases, general anesthesia should be used where there is the slightest deformity although if contraindications are met the method of Championniere (massage and heat) often relieves spasm. Local anesthesia with novocaine is quite efficacious if the services of an anesthetist are not available.

Every ambulance and industrial plant should be equipped with all forms of fracture appliances as well as someone who is able to manipulate them.

In conclusion I will leave with you the request that you study the patient as a whole and not treat the local pathology. A live patient with disability is better than a fatality with a perfect wound. Principles for the early treatment of trauma are:

1. Treat shock and hemorrhage.
2. Prevent infection.
3. Preserve tissue.
4. Early resumption of patient's activity.

IMPROVED INSTRUMENT FOR THE APPLICATION & REMOVAL OF WOUND CLIPS*

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THE multiplicity of methods employed by surgeons in the closure of skin wounds is prima facie evidence that no one ideal method has yet been devised.

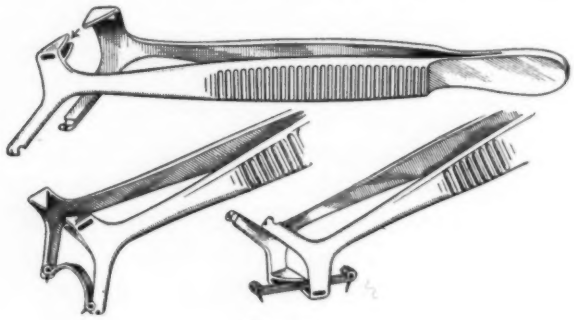

FIG. 1.

Metal wound clips have been in quite general use for more than a score of years and have some distinct advantages over sutures of any kind. The one drawback, discomfort and even pain on removal in some cases, seems to have prevented them from becoming more popular.

From my earliest surgical experience I have been partial to metal wound clips. Years ago I decided that the cause of most of the discomfort during the process of removal was that all the instruments available for this purpose required pressure from one side to insert the tip of the remover under the clip before it could be bent up and removed.

If a clip stood high the remover could be easily inserted and no pain was felt as it was bent out, not the least discomfort was experienced as it was removed; but in many cases the wound clips become more or less imbedded, covered by secretions or folded in a crevice and then the effort to dig the point of the remover in under the clip causes a drag on the clip by pressure from one side resulting in pain.

It seemed evident to me that if an instrument could be devised that would bring equal pressure on both sides of the clip while removing it, thus preventing the pull on the sensitive tissue of the newly formed scar, discomfort would be prevented.

I have used such an instrument now for about twenty years with the greatest satisfaction. The instrument for application and the one for removal are so combined that either can be ready for instant use because it frequently happens that a misapplication is made of a clip which must be removed and reapplied with little loss of time.

Metal wound clips have many advantages over all other methods of wound closure provided the clips are of the proper size and material for the case in hand and that they are rightly applied. They are made in three sizes and the selection of a size for a given case will depend largely on the location where the clip is to be applied and upon the characteristics of the skin of the individual.

For a thin-skinned patient, one with the skin loosely attached to the subcutaneous tissues, the small or medium size should be selected. For some thick-skinned patients and those with much firm subcutaneous fat, the large size is of advantage. The medium size is the most generally useful.

In applying wound clips much depends upon the assistant who must approximate the wound edges carefully with serrated tissue forceps as the clips are applied. The fact that no puncture of the skin is made when wound clips are used prevents the stitch abscesses frequently seen, not only in pus cases but in all too many clean

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cases where catgut, horsehair, silk etc. are used to approximate the skin edges.

Where interrupted silkworm gut or other interrupted stitches are used as tension stitches if wound clips are applied between them they prevent the skin edges from rolling under and assure better healing and less scar.

In accidental cuts, especially with children, wound clips are a great boon, for many even extensive cuts and lacerations can be nicely handled without any anesthetic, which would be impossible if needle punctures were required. Then with the removing instrument illustrated, pain is eliminated and the child not having been hurt when the clips were applied submits to their removal without fear.

Another advantage of metal wound clips is that, no matter whether we are on an emergency call to the backwoods or in the most modern hospital, they may be quickly and surely sterilized by passing them through an open flame, by chemicals or by boiling, and they may be resterilized many times without injury.

SUMMARY

It seems to me that metal wound clips that are just right in material and size for the case in hand provide one of our very best methods of skin closure in the great majority of wounds of election and in a very high percentage of accidental wounds.

And now that an instrument is available on the American market for the painless removal of wound clips which combines the instrument for application with that for removal, so that either is instantly available, it should come into much more general use, not only by the surgeon specialist but by the general practitioner who will find it a wonderful convenience in his minor work.

PILONIDAL CYST*

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IT is not the purpose of this paper to present a lengthy treatise on the etiological factors concerned in pilonidal sinus or, more appropriately, dermoid cyst, but rather to recall its underlying pathology and describe the essential steps necessary to effect a radical cure.

We are all aware that in the course of a routine physical examination dermoid cysts are not uncommon, that they occur in many parts of the body, chiefly in the midline, and that, as a rule, they are without symptoms. The patient is often unaware of their presence.

It is not the intention of the writer to discuss the uncomplicated dermoid cyst, but rather to confine his remarks to the infected types which commonly present themselves for treatment and are frequently improperly treated. If we but bear in mind the fact that a pilonidal cyst is simply another term for dermoid cyst and that it can, and does, occur in many places along the midline of the body, I am sure it will help to clarify our knowledge of the pathology underlying this disease. Without a clear conception of the underlying pathology it is not possible to institute the proper treatment for its cure. The relative frequency of dermoid cyst and its congenital heritage are well known, readily recognized, and with few exceptions, properly treated.

It is my intention to deal with the common exception; that is, the infected dermoid cyst or sinus occurring in the sacrococcygeal region. The treatment of the uncomplicated dermoid cyst is the same, regardless of its location, namely, radical excision.

The reasons for concentrating on the infected dermoid of the sacrococcygeal region are the following:

1. Its frequent occurrence in this locality.

2. Its anatomical position, rendering it susceptible both to trauma and transmitted infection.

3. Infected dermoids are rarely found in any other location.

4. Its tendency to chronic sinus formation.

5. The frequent failure of cure, due either to lack of knowledge of the underlying pathology, improper surgical technique, or both.

Etiology. The etiology of the uncomplicated simple dermoid cyst is briefly this: It is a congenital invagination, partial or complete, of the ectoderm with all its appendages. If the included ectoderm is completely surrounded, we refer to it as a cyst; if partly surrounded, as a sinus or fossa. Microscopically, the cyst or sinus wall contains all the true elements of skin, such as a layer of squamous epithelium, supported by a corium with its sweat glands, hair follicles, etc. This skin functions in much the same manner as skin in any other part of the body, and, so, we find in the cyst cavity hair, desquamated epithelium, sebaceous material, and fluid.

We are all aware that many people carry dermoid cysts from birth to old age in this latent state without ever being conscious of their presence. It is only when the added etiological factors of trauma and infection are superimposed that they begin to cause troublesome symptoms. Why we do not see infected dermoid cysts commonly in other regions of the body as compared to those in the sacrococcygeal region may be readily deducted from the fact that a dermoid cyst in this region is subject to frequent local trauma and is anatomically situated so close to the rectum that transmission of infection is easily accomplished. When we add, then, to the simple dermoid cyst the element of infection, the clinical picture changes perceptibly; pain, swelling and

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local cellulitis ensue, and one of two things happen, either the patient presents himself for relief, or in the course of time the untreated case finds an outlet much the same as encysted pus in any other portion of the body; that is, by sinus formation. To carry the pathological picture to its fullest, I need not mention that the sinus tracts in such an untreated case may be one or several, that they may find an outlet one inch or several inches from the original cyst, or that they may burrow deeply and widely, leaving the original cyst but a minor factor in the pathological picture. It is wish the treatment of such surgical pathology that I intend to deal, for there is hardly a surgeon who has not been called upon at some time to treat a patient who has not received previous surgical treatment for this condition with unsatisfactory results. There can be but one reason for this, and that is either a lack of knowledge of the underlying pathology or, recognizing that, failure to institute surgical means radical enough to eliminate the existing pathology.

In the larger hospital clinics where the public is better educated to clinical routine and specialties are more sharply divided, patients with infected sacrococcygeal dermoid cysts are usually assigned to or select the rectal surgeon. I can see no sound basis for this, as it is in no sense a rectal disease any more than an infected Bartholin cyst. It is true that its proximity to the rectum makes a differential diagnosis between that an fistula in ano necessary, but the failure of a probe to pass into the rectum readily rules out fistula in ano. In the acute stage pain referred to the rectum is a common symptom, and so the possibility of ischiorectal abscess must always be considered, but the absence of local rectal pain and tenderness on physical examination, as well as the anatomical location of the cyst, makes the differential diagnosis comparatively simple. Nevertheless, by custom, in the larger cities the rectal surgeon is called upon to treat a greater number of these cases than the general surgeon. This is not so in the rural or smaller communities where the general surgeon is called upon to treat all surgical conditions, regardless of location. He, of course, will see a proportionately greater number than the general surgeon in the larger cities. Out of approximately 25,000 admissions for all causes to St. Mary's Hospital, Brooklyn, during the past five years, 25 were for infected sacrococcygeal dermoid cyst or sinus, and about the same number in proportion was admitted to the surgical services of the Greenpoint Hospital, Brooklyn, during the same period. The vast majority of these cases had received previous surgical treatment with recurrence of the condition. The average duration was about three years.

It might be well to note here that many chronic dermoid cysts of the sinus type exist and never seek surgical relief, due to the fact that the symptoms are so few and the inconvenience so slight, that the patients hesitate to subject themselves to any form of surgery. It is only the type with severe acute exacerbations and disabling symptoms that we frequently see.

Pathology. Let me now state in simple terms the pathology presented for treatment in this type of case:

1. The invagination of normal, healthy skin with all its appendages, such as sebaceous glands, hair follicles, etc.

2. An accumulation of sebum, exudated lymph, and hair.

3. Infection introduced into the above media, followed by redness, swelling, cellulitis and all the associated symptom of infection. Trauma usually precedes infection.

4. Sinus formation along the path of least resistance, either down to the fascia of the sacrum or coccyx, or through some weaker spot to the skin surface. Here we must bear in mind that, like all encysted infections, one sinus tract may form, or several, that the sinus tract may be far removed from the original cyst cavity, and so may be one or several inches in length.

Treatment. In view of the above

picture, there is but one method of treatment, and that is radical excision. Incision and drainage are but palliative, never cure, and are justifiable only where the cyst is unruptured and temporary relief is sought. The patient should be advised of the possibility and rule of recurrence. Incision and curettage of the cyst wall is rarely sufficiently complete to accomplish a local cure. With this method we are bound to allow small areas of endothelium to remain, eventually to regenerate and form a new cyst wall.

Carbolization has been advocated by some. I have never tried this method. However, we are all aware that carbolic acid has limited penetrating properties, and in most cases would not destroy the entire corium. To my mind, it has no rational status and would require as much after-treatment, and cause as much pain and inconvenience, as radical excision.

Radical excision is the operation of choice. It eliminates the entire cyst wall; all sinus tracts can be exposed and eradicated. By this method alone can we assure the patient of a good end-result. It has but one draw-back, the time of debility; it requires from three to four weeks to heal. Immediate closure in the face of chronic infection is, of course, out of the question. The cavity must be packed and allowed to granulate in. It is often difficult to convince a patient that what seems to him a comparatively simple infection should require such prolonged treatment. In view, however, of the end-results obtained by other methods, radical excision is the only means by which we can assure him of permanent relief.

Technique. I do not intend to take the space to describe all the details associated with the operative technique. I simply wish to point out what I believe to be a most helpful aid in the excision of these cysts.

Gas-oxygen is the anesthetic of choice. Where this is contraindicated, local field block with 1 per cent novocaine, I have found to work well. The use of field block is limited to the well-localized chronic cases and should never be used in the presence of extensive cellulitis. Caudal block is dangerous because of the possibility of carrying infection into the sacral canal. Low spinal anesthesia is perfectly safe, and is used by many. A rectangular area, completely surrounding and outside the mouths of the cyst sinuses, carried down to the sacrum or coccyx, will give complete anesthesia where local block is indicated.

A 2 c.c. syringe with a small amount, e.g. 1 c.c., of methylene blue, is inserted into the mouth of the sinus, and with gentle pressure allowed to permeate the sinus tracts. Another method that works well is the use of melted paraffin. The paraffin is forced into the sinus tract by means of a 5 c.c. syringe and allowed to harden. When hard, a perfect mould of all sinus tracts enables the operator to dissect with accuracy. Excision begins in the midline, which is always the site of the cyst wall, is elliptical in nature, and carried down to the fascia or the sacrum or coccyx, following with a blunt curved scissors the sinus tracts wherever they lead, until complete excision is accomplished. No attempt is made to close this cavity. Packing is used to control oozing; according to the preference of the operator, iodoform or any other antiseptic packing may be used. I prefer sterile vaseline strip because it eliminates greatly the pain in the subsequent dressings. Repacking every forty-eight hours is all that is necessary, making the subsequent packs lighter and looser as the cavity begins to granulate in from the bottom. It requires about three or four weeks to reach the stage of epithelialization. With the exception of the first week, most cases are able to resume their activities, particularly if they are not of a laborious nature.

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EDITORIAL

REWARD AND PRECEDENT

WE are one of that large army of individuals who fail to comprehend many things which are held in sacred reverence by certain honest but pusillanimous people. Often the matter of precedent gives us a robust inward laugh; often, it initiates an exquisite mental pain. Whenever we read in the newspapers or in books dealing with diplomatic sketches of the frenzy caused in the ranks because unintentionally the fifth assistant attache from Graustark slid into the dining-room slightly in advance of the seventh under-secretary from Dreamland (wasn't the precedent established during the reign of King Flubdub that the seventh under-secretary always precedes the fifth assistant attache?), we enjoy a good laugh. But when we read that some one objects to a well-merited reward simply because he is fearful of creating a precedent . . . then, we suffer a great big mental pain. And this was the case when we read in *The Evening Post* of February 22nd "The Daily Mirror of Washington" by Clinton W. Gilbert. The heading is: A Pension Claim That Senator Smoot Is Holding Up.

We quote Mr. Gilbert's article in full:

Washington, Feb. 21.

DR. JOSEPH GOLDBERGER was one of the heroes of medical science. He risked his life many times trying to find the causes and cures of various baffling diseases. He did, among other things, discover the cause and cure of pellagra, thereby saving thousands of lives and millions of dollars in the cost to public institutions of caring for persons made insane by this wasting disease. He did all this on the small pay of a surgeon in the Public Health Service of the United States. He died young, leaving a widow and three dependent children. There is a bill before the Senate to pay the widow $125 a month pension. It has already passed the House, but Senator Smoot is blocking it in the Senate—I suppose, because he does not wish to establish a precedent for pensioning widows of surgeons in the Public Health Service.

If there ever was a case in which the people

of this country owed support to the family of one who worked for them it is the case of Dr. Goldberger. The pension proposed is meager. Money enough ought to be provided to bring the children up properly and educate them. At any rate, it is a poor return for the services Dr. Goldberger performed to allow his family to starve, even for the sake of maintaining precedents.

In the bill which came over the House to the Senate pensions are provided for sixty other persons, all ordered because the persons to be pensioned, or their deceased male relatives, were engaged in the great business of destroying life. Their claims are military. All or nearly all of these pensions will be voted without question. Mrs. Goldberger is the only person on the list who has a claim upon the generosity of the country because her husband made life more livable, less painful, subject to one less horrible disease. And Mrs. Goldberger herself was a heroine of the fight against pellagra. When Dr. Goldberger was assigned by the Surgeon General to study pellagra there was competent medical opinion to the effect that the disease was contagious or infectious. It was necessary to eliminate communicability as one factor in the prevalence of the disease. Mrs. Goldberger had blood from a pellagrous patient injected into her body. Her husband took the same chance with her. The war on disease is a dangerous one. Dr. Goldberger in his investigations contracted yellow fever, dengue fever and typhus fever.

It is hoped that before this sees print ways and means will have been found to give justice where justice apparently is due. If this matter is shelved and gradually forgotten because of precedent, it is to be hoped that some on who reads these lines will be able to keep this subject ever fresh and know the ways and means of again presenting it before the proper tribunals. And may people in control of various channels of publicity appeal to the public at large for fair play.

Precedent! A century does not produce a dozen physicians of Goldberger's size and worth. It would be good business for the government to guarantee an annuity to all the dependents of any and all who do as much for humanity as was done by that quiet, self-effacing government servant, a surgeon in the Public Health Service who died that others might live. Quibbling and splitting hairs over a pension of $125 a month to the widow of a man who saved "thousands of lives and millions of dollars in the cost to public institutions of caring for persons made insane by this wasting disease!"

If this pension establishes a precedent, —then, by all that is righteous let's ahead and establish it.

"But let us gentlemen, get along with the public business. I move you for an appropriation of two millions of dollars for a new post-office in the town of Yapville."

T. S. W.

Subscribers to The American Journal of Surgery *visiting New York City are invited to make the office of the publishers (Paul B. Hoeber, Inc., 76 Fifth Avenue, New York) their headquarters. Mail, packages or bundles may be addressed in our care. Hotel reservations will gladly be made for those advising us in advance; kindly notify us in detail as to requirements and prices. List of operations in New York hospitals on file in our office daily.*

CORRESPONDENCE

To the Editor:

I have had brought to my attention an article published in your JOURNAL of the October 1928 issue under the title of, "Extraperitoneal Ureterovesicostomy" by Dr. DeWitt Stetten of New York.

This article materially coincides in facts, principles and illustrations with an article published by me in the *Journal of the American Medical Association*, Vol. 51, No. 16, October 17th, 1908, page 1321.

I am taking this means of bringing the priority work to your attention and to that of your subscribers.

R. L. PAYNE.

Norfolk, Va.

To the Editor:

I am in receipt of a copy of the letter you have received from Dr. R. L. Payne of Norfolk, Va., claiming priority for the operation I described in the October 1928 issue of your JOURNAL, Vol. 5, New Series, No. 4, Page 325, under the title of "Extraperitoneal Ureterovesicostomy by a Simplified Technique for Postoperative Uretero-Abdominal Fistula." I have very carefully gone over Doctor Payne's article in the *Journal of the American Medical Association*, Vol. 51, No. 16, Oct. 17, 1908, Page 1321, and find that the only point of similarity in the two operations is the double slitting of the lower end of the ureter with the creation of two flaps. This is a method which has been in use for many years in all operations for implantation of the ureter into the bladder, and for which I had no intention of claiming any originality. I confess that I did not know that Doctor Payne was the originator of this idea, and am very happy to acknowledge the priority on this particular point to him.

As regards the essential features of the operation which I have described, I find no reference whatsoever to these in Doctor Payne's article. These features consist in incising the parietal peritoneum at the lower angle of the wound, drawing out a peritoneum-covered tongue from the side of the fundus of the bladder through the peritoneal opening, then suturing circularly the parietal peritoneum to the peritoneum of this tongue of bladder in order to extraperitonealize it and finally implanting the ureter into this extraperitoneal projection of the bladder. The actual method of implanting the ureter into the bladder, whether with lateral slitting, as it seems was originally proposed by Doctor Payne, or without this addition, is relatively immaterial, although I do believe that the lateral slitting is useful in making a firmer anastomosis and in preventing stenosis of the opening. While Doctor Payne has also performed his ureterovesicostomy extraperitoneally, the anastomosis was made at the base of the bladder near the original orifice of the ureter. In the operation I described, I purposely selected the intraperitoneal lateral portion of the fundus of the bladder, which I extraperitonealized in order to overcome the tension that would occur if an attempt were made to implant the ureter where Doctor Payne suggests it should be made, and also to avoid the usually used intraperitoneal and transabdominal implantation, so as to dispose of the danger of peritonitis from leakage and the possibility of secondary intestinal obstruction due to the ureter acting as a band.

DEWITT STETTEN.

New York, N. Y.

To the Editor:

I wish to acknowledge receipt of your letter of the 13th with thanks and again, if consistent with the policy of your JOURNAL, renew my request with you that you publish my recent letter relative to Dr. Stetten's paper.

Neither in my article published in 1908 on "Transplantation of the Ureter into the Bladder" nor at present do I claim any originality. However all the principles in Dr. Stetten's paper published in your JOURNAL of October 1928 was so thoroughly and completely covered in my original article, that I think it is only fair that this should be brought to the attention of your readers through the pages of your Journal, especially since Dr. Stetten seems to be entirely unfamiliar with my work and numerous similar papers since published by other authors.

The extraperitoneal operation, in my opinion, is the only one to be done in these cases, whether the anastomosis is made into the posterior wall of the bladder or the lateral aspect and I see no sound surgical excuse for opening the peritoneum or using the peritoneal surface of the bladder as suggested in Dr. Stetten's article.

R. L. Payne.

Norfolk, Va.

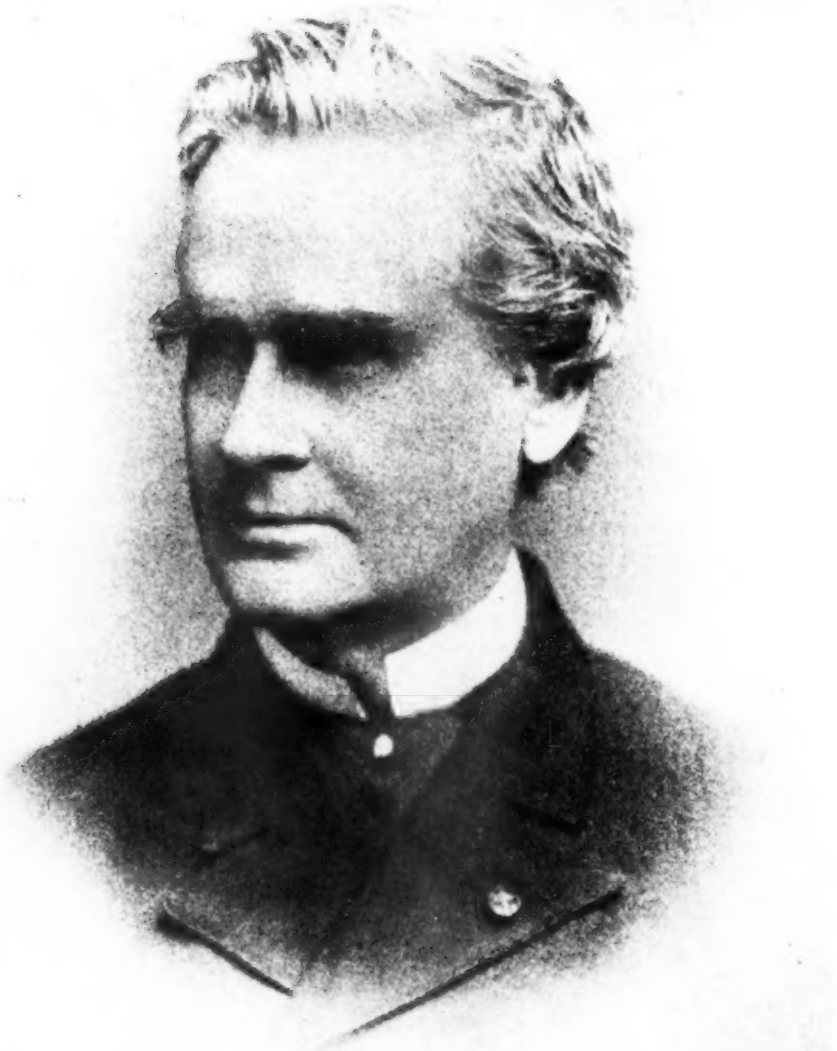
To the Editor:

I wish to acknowledge receipt of your letter of February 21st, with a copy of Dr. R. L. Payne's second letter in reference to my article in the October 1928 number of your Journal on "Extraperitoneal Ureterovesicostomy."

In reply thereto I wish to say that I too have made no claim for any great originality in this operation, except that I feel that I have devised a safe, simple and effective method of implanting the ureter into the bladder by an extraperitoneal route without tension, and, that as far as my search of the literature reveals, this particular technique has never before been described. It is quite true, as Doctor Payne states, that the principle of extraperitoneal ureterovesicostomy is not new, but this same statement holds largely for practically every advance in surgical technique. Most such advances are based upon old and established principles and are merely improvements upon methods that have been previously used. In spite of Doctor Payne's contrary opinion, I believe that the method I have advocated is a distinct improvement upon the plan that has been in use hitherto, and which he seems to advocate. The use of the peritonealized surface of the lateral portion of the fundus of the bladder permits of a much firmer anastomosis and does not produce as great a tension at the suture line, as when such an anastomosis is made at the non-peritonealized base of the bladder. The opening of the peritoneum can only be regarded as a theoretical objection, as the peritoneal cavity is immediately closed by a circular suture between the parietal peritoneum and the peritoneal-covered portion of the bladder.

DeWitt Stetten.

New York, N. Y.



J. MARION SIMS
[1813-1883]

DOUGAL BISSELL
J. Marion Sims, Surgeon and Humanitarian

The American Journal of Surgery
N. S. Vol. VI, April, 1929

[From Fernelius' Universa Medicina, Geneva, 1679.]

BOOKSHELF BROWSING

J. MARION SIMS, M.D., LL.D.*

SURGEON AND HUMANITARIAN

DOUGAL BISSELL, M.D., F.A.C.S.

NEW YORK

MARION SIMS is a good example of a large group of men who showed no brilliancy at college, but who, through self-culture, developed wonderfully their latent talents; a class in which thirst for knowledge is awakened not by living in cloistered, scholastic halls, but by personal experiences with their fellow men. His consciousness of having failed in College to cultivate self-expression by means of written words led him into great embarassment when the opportunity came to record his first great surgical achievement, and it was with so much chagrin he beheld his first printed article, that he immediately hid it in a medical book, where he hoped that it would remain and never again disturb him. It was this article, however, which introduced him to the scientific world as an original thinker and successful operator; but, as life's conflicts increased, he acquired more and more confidence, and at last he awoke to the realization of the fact that, to succeed in the war he was waging, words were essential. It is then we find him not at a loss for these weapons, nor lacking skill in their use.

Sims was not prolific in his contributions to literature; including his autobiography and addresses, they number only about thirty. Some of them are ordinary, but others are well expressed and well constructed and most of them contain brilliant conceptions. His autobiography does not do him justice from a literary standpoint[1] and he might easily be misinterpreted, if one were inclined to be hypercritical, for we find him saying: "Simple and beautiful methods I have discovered." Throughout the book he constantly speaks in this way, but all records of his life show that he was particularly modest and free from conceit. The remarks of the character referred to were, in reality, not outcroppings of egotism, but expressions of intense love of truth and beauty, and were said in the spirit of one who, in an ecstasy of delight on discovering a beautiful creation of nature, expresses himself with no consideration of self as the discoverer. Again he said, contemplating the result of his work, "Could anything be more beautiful?" Here he reminds one of a painter who has produced a real work of art, knows it and is in love with it, not because *he* has produced it but because in reality it is beautiful, and he is jealous of

[1] In justice to Sims, it should be said that he died before completing his autobiography, and therefore had no time to review it.

* Read before the South Carolina Medical Society of Charleston, Nov. 22, 1927.

it, chiefly to preserve it. I have no doubt that creating gave Sims unbounded pleasure, pleasure which was based upon the satisfaction of having accomplished something, something in which he first saw hope, then evidence of relief to suffering woman. It was this, above all the emotions which overwhelmed him, that made his work beautiful to him.

Sims was not a reckless surgeon, as many of his enemies tried to make it appear. He may at times have seemed so, because he blazed the trail or ventured in unfrequented paths, but, by analyzing his work, it will be found that every step he took was the result of logical thinking, and his boldness was always within the limits of reason. A good example of clear thinking and brilliant action, also of a well-developed ethical sense, is found in his very early professional life, when he was confronted with a surgical problem which his confreres had hopelessly attempted to solve. In this instance we find his mind driving straight to the source of the disease. Others had considered it a medical case, he a surgical case, but not wishing to seem unduly bold, he insisted upon consultation. The illness had been of long duration and practically every physician within the radius of one hundred miles had already been called for advice. His examination convinced him that there was a deep-seated swelling in the region of the liver, and that fluctuation could be detected. He felt that the responsibility should be shared and, remembering that within a day's journey there was located a young physician who had had the same advantages he enjoyed in Philadelphia, suggested him for consultation. The meeting ended, unfortunately, in a disagreement. The patient accepted his advice and the bold operative venture was rewarded with immediate relief and eventual cure.

Who can read, without a feeling of profound admiration, the story of his meeting with the hideously repulsive woman, whose facial deformity compelled her to wear a dark veil of double thickness, to prevent even her own family seeing so repellent an object. She approached him with but little hope, but he calmly told her that he could cure her deformity. He knew that a surgical effort to cure her would be a tremendous venture, but he also felt that for him not to attempt it would be cowardly. Sheer audacity seems the only word fitted to describe the position he assumed. His stand was the result of surgical confidence acquired from experience, and his effort ended in a brilliant success. The reconstruction not only gave the woman a presentable appearance, but permitted the placement of an upper set of teeth, with which nature had not provided her. The success of this combined restoration forced Sims, through the insistence of his friends, into the first publication already referred to.

Sufficient has perhaps already been said to show that Sims was self-reliant, logical in reasoning, direct in action and that his contributions to surgery were noteworthy; but there stands out boldly a surgical masterpiece, created in Paris in 1878, which warrants a high place for him among the general surgeons of history.

On April 18, 1878 Sims, while in Paris, operated upon a woman with a tumor in the right hypochondrium. His diagnosis was a cyst connected with the liver, whether hydatid or "dropsy of the gall bladder" he could not say. One month before operation he advised aspiration as a means to guide subsequent treatment. This was done with relief to the patient and with the attainment of information regarding the tumor. The relief, however, was only transient, but proved sufficient to encourage the undertaking of a more radical step, namely, the opening of the gall bladder and the making of a permanent fistula for drainage. The following is his line of reasoning in arriving at this decision.

Firstly, we saw much improvement in all her symptoms following the temporary removal of the fluid by aspiration; secondly, it would be an imitation of the efforts of nature in all

such cases where recovery has taken place; and thirdly, speedy death was inevitable if we did nothing.

On the date given he performed the first cholecystotomy recorded, and gave the name to this operation by which it has ever since been known.[2] Although the patient died on the eighth day, necropsy showed that death was not due to peritonitis. Sixty stones were removed at the time of the operation, sixteen more were found at autopsy, secluded in the lower part of the gall bladder, which accounts for the failure of their removal at the time of operation. Death occurred "from passive internal hemorrhage, the result of the poisonous effect of the biliary salts on the blood." Further to sustain his position he argues.

This case proves that it is not necessary to wait for the tedious efforts of nature, on the one hand, nor to resort to the clumsy process of caustics on the other. The propriety of the operation being established, we can hereafter resort to it at an earlier period, before the changes are effected in the blood by the bile acid which leads to its extravasation from the mucous membrane.

Dr. Samuel D. Gross, a contemporary of Marion Sims, and at that time America's leading surgeon, relates that, during his early student life, he read an account of a consultation where a patient who had had an aneurysm was advised by his physician to go to Philadelphia for an operation. He pondered over this and wondered why a physician sent so interesting and important a case away. Then it dawned upon him that the physician might have considered himself incompetent, or did not have the courage to undertake the work. From that moment Gross determined so to equip himself as to be able to meet every emergency and never to send a patient away. In the attitude Gross here assumed, it is at least suggested that he thought that every graduate of medicine should be prepared to solve every problem which might arise. His ambition to treat and cure all ailments of men was laudable and perhaps no man was better equipped to meet surgical problems, according to the knowledge of his day than he eventually became, for he led the America vanguard of general surgical thought, knowledge and skill; but able as he was, he must have been constantly confronted with impassable barriers. Sims, in contrast, was not a student, in fact, had but little opportunity to read, even had he been so inclined. He depended more upon the surgical principles acquired from the practical training of Dr. George McClellan, also Gross' instructor, combined with his natural ability to solve unfamiliar or altogether new surgical problems, than upon suggestions from personal contact with advanced thinkers, or through current literature. His was the bold mind. His guiding star was that of the pioneer, who dares to venture into the unknown, equipped with natural endowments and a few acquired principles of his calling.

Gross advanced along general lines. Sims became particularly interested in solving seemingly impossible individual problems, which eventually directed him into the conquest of a special field. The surgical world needed both of these men, vastly different though they were in intellectual attainments.

Life and work were synonymous to Sims, but his greatest ambition, outside of his unquenchable desire to help humanity, was to teach others, so that those taught might carry on. There is no brighter page in the annals of American Surgery than that which relates to his enlightening surgical conquest of France, Belgium and England. He succeeded in curing many gynecological cases which had previously defied the efforts of Europe's greatest surgeons. He acquired the confidence of the scientific men and of royalty and was elected to membership in their scientific societies and awarded decorations. His early struggle in New York City to establish

[2] Reported without the knowledge that Dr. Bubbs of Indiana had preceded him in operating, by a few months.

himself as a teacher was heartbreaking, but he eventually succeeded. By his enthusiasm, energy and tenacity of purpose, in the face of sickness and persecution, Sims won the sympathy and interest of a small but influential group of men and women; by his personality and scientific achievements he gained their confidence and stimulated the building of the Woman's Hospital, an institution which has been far reaching in its beneficent influence in the restoration of woman to health, and which today is a living and growing monument to his great genius.

It is almost half a century since Sims passed from the field of surgical work. Is this lapse of time sufficient to give a proper perspective for study? Are we able now to estimate the man in his varied capacities? Can we measure his skill and its results, the height and breadth of his mind, the depth of his soul? Properly to estimate the value of his work, the conditions under which surgeons then performed their daily tasks must be taken into consideration. Sepsis and asepsis were unknown terms. Neither Holmes nor Semmelweiss had as yet stirred his prolific brain to suggest the probability of a hidden, minutely small, but communicable poison. The great Pasteur had not yet promulgated his bacterial doctrines, and Lister was still talking about laudable pus. The silk suture, then in universal use, was by its capillary action a harborer of bacteria, and the mechanical factor, particularly in the vesicovaginal field, in preventing primary union; but, with the silver suture, Sims defied the laws of local inflammation and thus reached his goal.

The single-blade speculum, though original with him, had, in varied forms, been previously invented. The perfection of it was enough in itself, however, to put the profession under lasting obligation to him, for Recamier's cylindrical instrument, then in vogue, did not permit of surgical access to the genital canal, except in a very limited way. The Sims' position, while in reality merely a variation or modification of positions already used and of but limited use today, was in his day an important factor in making his achievements possible and, with the speculum, is further evidence of his genius.

Our estimate of him as a surgeon must therefore be based upon the fact that his achievements were in the preaseptic days, and that he combatted successfully hidden forces against which the conflict seemed hopeless until he made practical his rediscovered weapons of defence.

Sims was intensely human, with faults, but no dishonor of soul. His life was active and colorful; but, in commenting on his personality in an address of this character, we are of necessity confined to characteristics which are reflected from his varied professional contacts and experiences. Some of his conspicuous traits have already been dwelt upon. His sense of chivalry was exhibited on many occasions, but one with international flavor is of particular interest. When France faced Germany in 1870 Sims offered her his professional services and was made Chief of Staff of the Anglo-American Hospital Corps at Sedan. For this service the grateful Republic conferred upon him the Order of Commander of the Legion of Honor. But, while his love of France glowed bright and constant within him, his love of humanity was not thereby lessened, for his medical services were given alike to friend and foe as testified to by one thousand grateful Germans.

In 1876 Sims, while operating on the daughter of Dr. P. A. Wilhite,[3] was informed of the history of Dr. Crawford W. Long's very early application of ether-anesthesia and of the five surgical operations he performed while the patients were under complete anesthesia. This startling discovery so played upon his sense of truth and justice that he began an analytical study of the history of ether-anesthesia, which ended in his writing an address in which he championed

[3] Wilhite was the first completely to anesthetize a person by ether, though done unintentionally.

the claims of Dr. Long. Though bitter in his denunciation of the unethical methods of Morton, who was four years later than Long in the use of ether as an anesthetic and whose motives were chiefly to commercialize his secret remedy, "Letheon," yet he was willing to accord him justice for having made it possible for ether anesthesia to have been so early popularized through Drs. Warren, Hayward and Bigelow of the Massachusetts General Hospital, and proposed that Congress award the families of each contestant for the honor of priority, by an endowment of $100,000; and further, that a national monument be erected to the American discoverers of anesthesia and that the names of Long, Wells, Morton and Jackson be inscribed upon it.

One of the saddest episodes in Sims' life, and one he regretted perhaps more than any other, was his voluntary but eventually forced resignation as Surgeon to the Woman's Hospital. No event in his career shows more plainly his human side. Indignant at the failure of his colleagues on the surgical board to support him in his objections to the ruling of the Board of Governors, which debarred all cancer cases from hospital care and restricted the number of spectators at operations, he arose in the midst of an annual meeting of the officers and friends of the institution, and poured out his injured soul in eloquent defence of those afflicted with cancer[4] and in scathing criticism of a rule which limited the number of visitors at operations. His impetuous nature spurred him on at an untimely moment to champion a just cause, and he went down to defeat. He recognized his indiscretion, his tragic mistake, and, with the courage of a true nobleman, he did all that could be done to make amends. He apologized and admitted that his criticism was "in violation of good taste and propriety." His spirit was saddened, but his soul was unconquered; he forgave his enemies but was not by them forgiven.

[4] Sims introduced the use of chloride of zinc in the treatment of inoperable cancer.

Although Sims cannot be ranked as a superman, the principles of whose discoveries are essential to the development and continued progress of science, yet his place as a thinker and doer who advanced science many years is assured, for he reaped a harvest of relief from pain and suffering such as few have before or since his time. He was fundamentally one of moral fiber, sensitive and refined, gentle as a woman, jealous of truth, with a spirit of philanthropy and brotherly love akin to that of Joshua Ben Joseph.

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BOOK REVIEWS

We are living in an age when industrial or traumatic surgery is of paramount importance. It is important because it differs from the surgery as taught in medical colleges, because it has a direct relation to industry and, also, to the future usefulness of individual members of society.

And so Doctor Forrester's work[1] is timely and a much needed addition to the surgical literature of the day. Many surgeons of more than average ability, because of a lack of opportunity to see great numbers of traumatic surgical cases and the proper understanding of this phase of surgery commit many blunders and get poor end-results.

[1] Imperative Traumatic Surgery with Special Reference to After-Care and Prognosis. By C. R. G. Forrester, M.D., F.A.C.S., N. Y., Paul B. Hoeber, Inc., 1929.

Doctor Forrester, who is a recognized expert in this surgical field, covers his subject thoroughly. There is no padding. He shoots for the bull's-eye and hits the mark.

After the introduction the main chapter headings are: Preliminary Examination of Patient for Operation; Roentgenology in Traumatic Surgery; Injuries to Head; Traumatic Arthritis of Shoulder with Ultimate Fibrosis; Fracture of Clavicle; Injuries of the Scapula and Humerus; Injuries of Elbow, Radius and Ulna; Injuries of Wrist and Hand; Injuries of Ribs; Spinal Injuries; Injuries of Pelvic Region; Dislocation of Hip;Injuries of Femur; Injuries of Knee; Injuries of Tibia and Fibula; Injuries of Ankle; Injuries of Foot; Treatment of Compound Fractures; Surgical Interference in Treatment of Fractures; Surgical and Non-Surgical Treatment of Injuries to Peripheral Nerves; Osteomyelitis; and Index.

The 598 illustrations and charts have a distinct bearing on the text and have not been placed at random to give the book a "good appearance." Every surgeon, especially the one doing industrial surgery and he who sees a great deal of traumatic surgery, and the general practitioner who is open to the first call to treat traumatic surgical conditions, will find a wealth of information in Doctor Forrester's book. It is a valuable addition to present-day surgical literature and practice.

Operationslehre[1] is the first volume of a new and comprehensive work on operative surgery by the directors of the surgical clinics at Königsberg. Principles and technique are the foundation stones on which this work is built. Step by step from the reception of the patient to the removal from the operating table, the ground is covered with old-fashioned German *Gruendlichkeit*. Seven hundred and nine thoroughly satisfying half-tone illustrations, most of them colored, within the space of 621 pages is in itself an indication that the progress of each operation is thoroughly illustrated. Ingeniousness is shown in the use of superimposed colors, so that one figure may be interchanged to illustrate various points.

Bibliographic references are omitted and what quotations are made are mostly from German clinics. The work would seem to cover completely and thoroughly the technique at Königsberg and this is of particular interest. Space is taken to illustrate instruments but it must be admitted that the arrangements shown and the suggestions made are thoroughly practical.

The use of color has been carefully planned, has a definite purpose in each instance and is not made merely for typographic effect. The paper, typography and press work are all that can be desired.

The price of over $25.00 for one volume of an operative surgery is a bit appalling. Examination of the actual volume with an idea of the cost of production makes this price on the face of it perhaps defensible. On the other hand, it would seem that the very price would necessarily limit the circulation of a book which on its merits should be in the hands of every surgeon. Compared to our American publications this price seems extraordinarily high; however, the production of a book like this in this country would probably be out of the question on account of its very cost. The question of whether such books had better be published without consideration of their selling price is debatable. For those who cannot afford them, they would at least be available in the libraries. To this problem the reviewer has given much thought and has been unable to reach a definite conclusion. It is hoped that this may be discussed by readers in the correspondence columns of The American Journal of Surgery.

The author of this work,[1] formerly professor of pathology at the University of Budapest, handles his subject with typical European thoroughness. The seven chapter headings indicate the comprehensiveness of the work: The Development of the Adrenals; Anatomy; Physiology; Pathological Anatomy; Pathophysiology of the Adrenals; Organotherapy; Bibliography. To a thorough knowledge of the literature the author adds his own conclusions, based on many years of laboratory work. The present monograph is an elaboration of a work published by the author seventeen years ago. Goldzieher's statement that "the more knowledge we are accumulating on the function and on structural changes and functional disturbances of the individual endocrine organs, the more we realize the dependence of each of these organs upon all the rest," is not to be gainsaid and we must also agree with him that

[1] Operationslehre: Allgemeine und Spezielle Chirurgische. By Dr. Martin Kirschner and Dr. Alfred Schubert. Berlin, Julius Springer, 1927.

[1] The Adrenals: Their Physiology, Pathology and Diseases. By Max A. Goldzieher, M.D. N. Y., The MacMillan Co., 1929.

"it seems futile to discuss, for instance, the function of the thyroid gland and its disturbances without considering simultaneously the changes and the interference of the adrenal, the thymus, the gonads and possibly that of all the other endocrine glands." Accepting these statements as the basis of the text and in view of the author's standing it is readily seen that the book will be found invaluable by every student of endocrinology. In this classification should be included practically every physician and surgeon today. The text ends with a bibliography of 100 pages divided as the chapters. A good index closes the book but it is unfortunate that an author index is not included, for unless one knows which phase an author has covered there is difficulty in finding the references in the bibliography.

The subject matter of this book[1] is described by its title. It is a thoroughly conscientious and fairly complete monograph covering the entire subject and heartily recommended to all physicians reading French.

The technique of gall-stone operations is thoroughly discussed in this book[2] and the anatomical part by Dr. Schumacher of Vienna is an invaluable addition. The illustrations are, in the main, photographs, with some line cuts and with the addition of color wherever necessary to demonstrate distinctly the points made. The two-page table of contents gives a thorough insight into the subject matter of the book. But it is to be regretted that no index is added, a fault we so often find in German and French works otherwise so splendid. It would really seem that in a book of 240 pages with 108 illustrations, selling for $9.00 the reader might reasonably expect a complete index.

[1] La Diagnostic Dans Les Affections De La Colonne Vertebrale (Chez L'Adulte). By P. Oudard, A. Hesnard and H. Coureaud. Paris, Masson et Cie, 1928.

[2] Die Technik der Eingriffe Am Gallensystem. By Dr. Peter Walzel. Einem Topographisch-Anatomischen Teil by Dr. Oskar Schumacher. Wien, Julius Springer, 1928.

No better review of this book[1] can be written than to quote in full the foreword by Dr. Elliott P. Joslin as follows: "The surgical diabetic has been the serious diabetic, the diabetic who died. This is still true and to an extent ever must be, because the surgical diabetic is the one with the most complications. Yet insulin and concurrent surgical and medical effort have won unlooked-for victories. It will be easily understood, therefore, that I, and indeed many of my patients as well, have watched the compilation of this book during these last few years with deep interest. What a blessing it has been to have two young zealots working over my cases, striving to make the result of each fresh and surgical encounter more successful than the last! And now it gives me pleasure to see their experience made available for all." With such an introduction there need be no hesitancy in recommending this book to every surgeon who either has or expects to operate on a diabetic patient.

Any author who produces a book[2] for the medical profession that will make the reader think is entitled to credit. And this Dr. Ibotson has certainly succeeded in doing. To agree with all statements in the twenty-two chapters would be asking too much but there is not one of them that is not stimulating. The author protects himself against criticism in his preface by saying: "I am merely endeavoring, as far as I am able under my conditions, to make a beginning of the collection of such facts, hoping that others will expand them and that the subject may bear fruit." A wide circle of readers for this book will undoubtedly lead to further research which, in turn, must undoubtedly "bear fruit." Whether we agree with the author's conclusion or not this is a book to be read and re-read and not to be laid aside lightly.

[1] Diabetic Surgery. By Howard F. Root, M.D., and Leland S. McKittrick, M.D., F.A.C.S. Phila., Lea & Febiger, 1928.

[2] Partnerships, Combinations and Antagonisms in Disease. By Edward C. B. Ibotson, M.D. Phila., F. A. Davis Co., 1929.

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